MAGAZINE

Airborne

AND R.C. MODELS

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NUMBER 111

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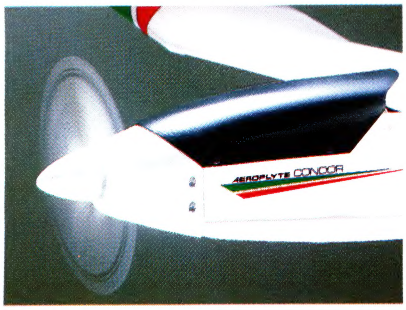

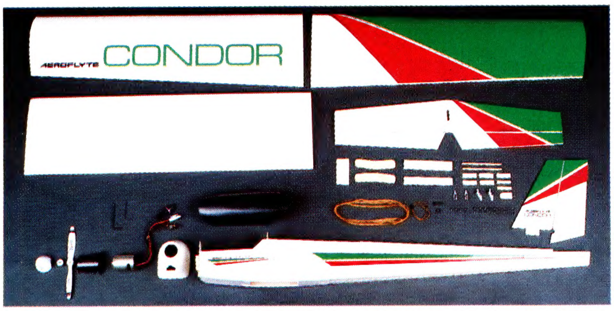

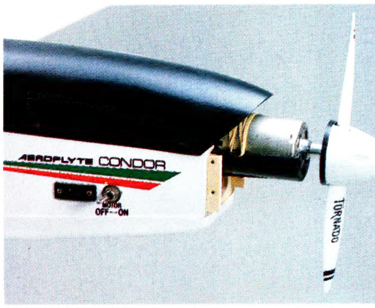

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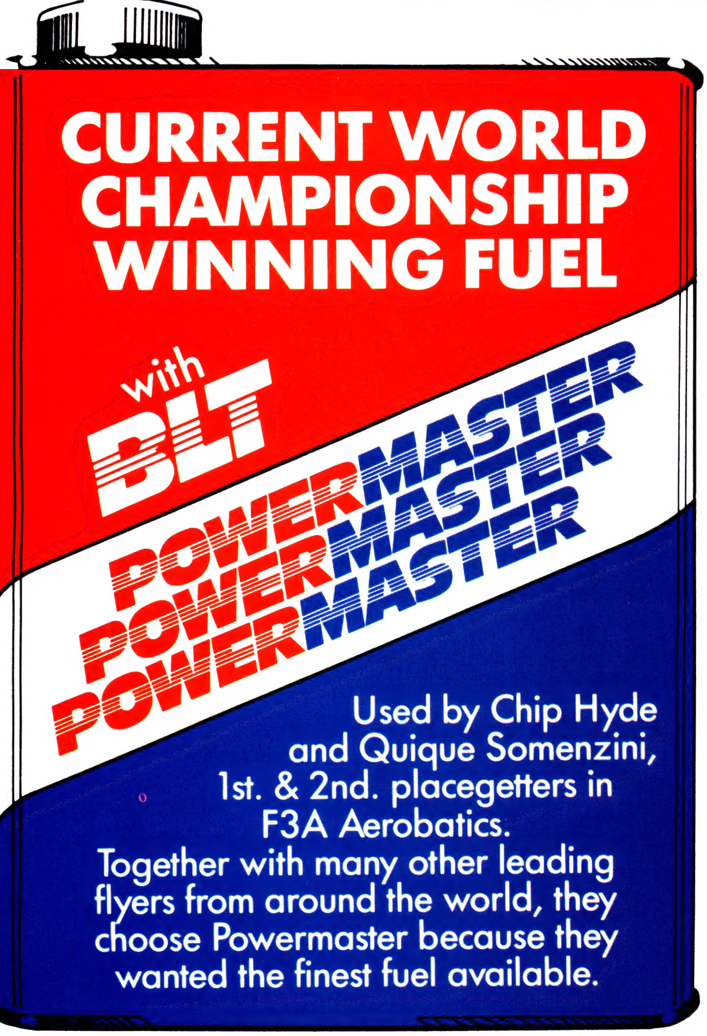

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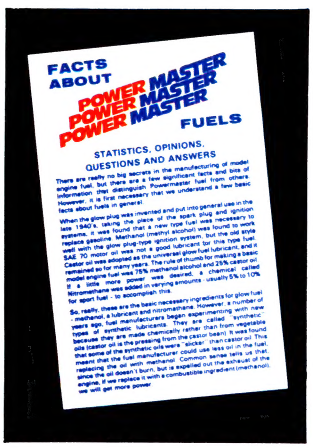

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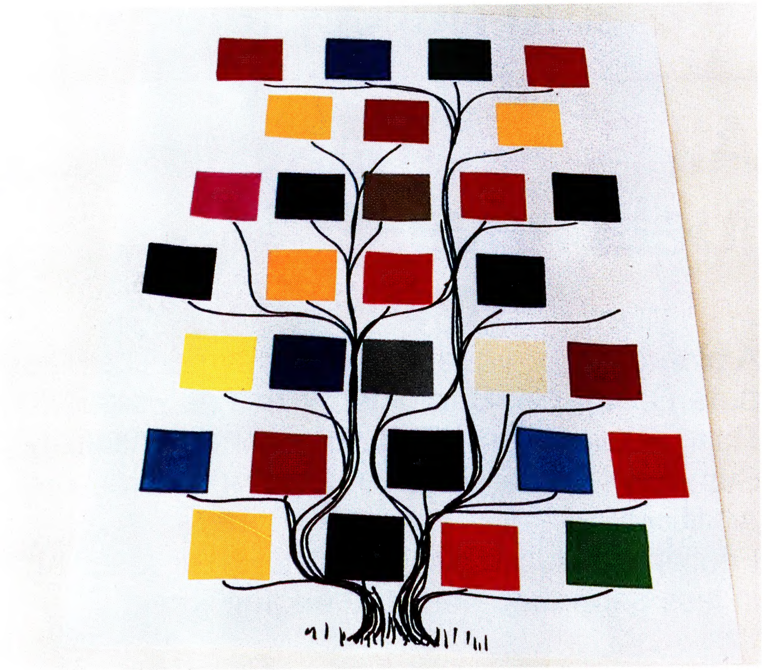
Narrabri club member buzzes the local field with his Cessna 310. More of the story is inside. Nice camerawork by Graeme Smith.

The 1/4 scale Clipped Wing Cub is flown by Jim Mulcahy at Atkinsons dam, north-west of Brisbane. For company he has Sam Holmes, at left. A half-squadron of float plane enthusiasts enjoy this excellent venue on a regular basis.



Strange looking tree sent in by a junior modeller, uses scraps of iron-on films to show off some of the colours available, but this photo does not do justice to the range and brilliance.

A rare bird, a Lake Buccaneer amphibian, photographed by Paul Skeat at the Temora RAAF Training School re-union in April 1991. Who has a flying model?

A fish-eye lens view of competing gliders at the NSW State Championships in Muswellbrook. The machine in front is the winner, Peter Abell's LB5.

A new RC pattern design using traditional materials is the feature construction article in this issue. Very neat aircraft and a good project for new pattern flyers. The name? Hah! Need you ask?

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The Editor, RMB 1798, Benalla, Vic., 3673.
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CONTENTS

COVER STORY

The elegance of the golden age of aircraft is brought to life with Doug McIlaraiths Waco YMF5. At 30% scale size and powered by a 90cc Sachs Dalmar engine it even sounds scale. Danielle Moore (Sufers Paradise Swimwear Model of the Year) adds that extra touch of glamour. Photography by Kevin Poulter Studios Melbourne.

ADVERTISERS INDEX

From the Cockpit

NATIONAL HELPLINE

The idea started by John Stroud, Editor of Aeromodeller, already has an international membership. The first Aussie to throw his balsa knife into the ring is Doug Moody of 16 Yalumba Crescent, Toowoomba, Qld., 4350. He is available Monday to Friday after 1800 hours on (076) 34 4078. Thanks Doug.

Don't ask why your Editor is not making the same offer that Doug has. Judging from the number of questions I get already, I don't need to join the Helpline. It has joined me!

YET ANOTHER MAGAZINE

This one is the CIAM FLYER, produced by the FAI Aeromodelling Committee. The March '92 issue, No. 2, is just 16 pages, but glossy paper and very contemporary in layout. The Editorial is by Theo Georgiadis. Chris Greenwood provided my copy. Be curious! It's worth a look just for new ideas.

CONGRATULATIONS TO .....

... Paul Lagan, for being awarded the Alphonse Penaud Diploma at the recent FAI meeting in Paris. Paul was the standard-setter in free flight here in Oz during his years working in the RAAF, just as he was in Kiwiland before he crossed the Tasman, and also now that he has returned there. He has also flown RC pattern and some CL, among other things, i.e. classes.

.... Chris Greenwood, for being elected as Secretary of the CIAM Bureau, at the CIAM Plenary Meeting last month. Chris joins a growing list of Aussies who have gained recognition in the international sporting aviation arena for their accomplishments and expertise. CIAM knows how to find the best.

PLEASE CHECK IN ....

.... Contact addresses are requested for LARCS of Brisbane, the Melbourne RC Club and the Sunset Soaring Club. There is some good news waiting for you at RMB 1798, Benalla, 3673.

SCALE RC GLIDER TO GO NATIONAL

At the third scale soaring event at Waikerie early in March, it was decided to form a new organisaion to promote scale soaring in Australia. The principal aim is to generate more meetings at more venues and enable scale glider guiders all over the country to participate and enjoy this special type of flying. Martin Simons heads a committee that includes John Copeland, Max Newcombe, Ron Carson, Peter Melders and Josef Rufenacht. Delegates from all other states will be invited to join this group, and official MAAA recognition of this new special interest group is expected.

CONGRATULATIONS ....

...to Peter and Caroline Goldsmith who have been invited to compete in the Tournament of Champions at Las Vegas later this year. Australia's only representative at the TOC for the past ten events, Jeff Tracy, bows out at his own request, and one of our top pattern pilots will get a well-deserved opportunity to sample this special competition that is outside the mainstream of RC aerobatics. On behalf of all our readers, we wish them well.

FEATURES FOR THE BUNDABERG NATS

It's a long, long way to Ti.... Bundaberg for most of us, and the Nats organising committee, with Cec Bardell as secretary, has set the dates from 31 December 92 to 6 January 93; which allows 4 days after Xmas to travel to Bundaberg. Since it finishes on a Wednesday, there are 4 days afterwards for travelling home before starting work the next week.

Social activities will be given higher priority, and this should be easy as B'berg is a coastal city with a cooler climate than Amberley. There will be a New Year's Eve party after the registration and briefing, with catering and bar facilities provided. There will be a BBQ before the Night Scramble on Sunday 3 January, and another BBQ before the Auction on Tuesday 5 January. The Auction will incorporate a Trash & Treasure style market, and the Nats Special Awards will be dealt with during the evening. Don't forget to bring your gong!

The Nats committee is going to invite people to volunteer their services as officials, and in return for a couple of days' work, officials will get the same privileges as competitors, including a goodie bag and special badge.

It is hoped that trade sponsorship will enable a daily lucky-number draw to be made, using the numbers on the Nats program, and it will be announced on the local radio station 4BU, which is a major sponsor. Competitors and officials will be given a program and thus will be able to participate in the daily draw, while the public will be asked to pay for the program, which will also give entry to watch the events at each venue for the duration of the Nats.

It has just been announced that Futaba Australia will also be a Nats sponsor for 3 Nationals, beginning with Waikerie, then including Bundaberg and the following NSW Nationals. Modellers are required to reserve their own accommodation at Bundaberg. This should be done directly or through the local club PRO at Bundaberg. Enquiries may be directed to the Nats Secretary at PO Box 522, Bulimba, 4171

SEEN AT THE NATS

1. Carbon fibre epoxy F1B motor tube 700 mm long, about 32 grams; $30 from Bolly Props.
2. Aussie Hinges; plastic strip style, thinner than other brands, matt surface, no crease, fix with cyano; from Aussie Models, Box 230, Marden SA, 5070.
3. Kites for those windy days to make the trip to the field worth while; from Fighter Kites Australia 7 Pellett Street, Greensborough, Vic., 3088.
4. Plan of Norman Lyons 2FC of 1931. Mark 2 version of 36 inch span rubber model, $5 each from Doonside Aeromodellers Club, P O Box 11 Doonside, NSW, 2767.

L.S.F. — TWO HIGHLIGHTS

Two significant events concerning the League of Silent Flight will be noted for 1992. The first is that Rob Benton has attained Level 5, after a long quest for this elusive goal. He will be another popular winner of this award. He joins Mal Pring and Eddie Smith, to make LSF5 the most exclusive Aussie modelling club.

Congratulations, Rob. Are you wondering what is involved in Level 6?

The other event is the annual LSF Tournament to be conducted at Jerilderie over the Queen's Birthday weekend, 8, 9 & 10 June. The weather is due to be good this year, and without the noise of ordinary model aircraft, it is a magical experience. Newcomers run the risk of getting hooked on pure flying.

Enclosed gyrocopter seen at the Easter Fly-In near Echuca. Three bladed pusher prop appears to be carbon. Rotor mast is square section tubing. Photo by the Editor.

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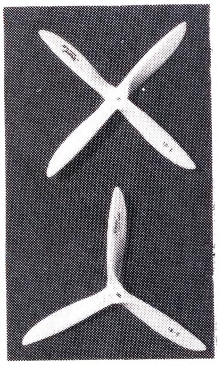

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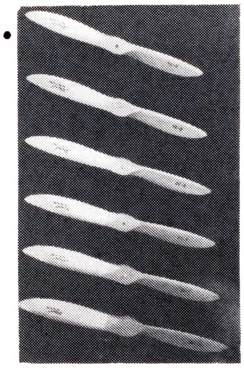

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Letters to the Editor


At the Noarlunga Fly-In, Gary Aldgate with his 1/3 scale Sopwith Pup, while in the background Mary Wagner tries the Boeing Stearman for size. Both aircraft are powered by 4-strokes, but of different sizes! Photo from Rob Pratt.

The following letter may appear to be similar to a contest report, but it makes two very important points that need to be included in discussions between model flying clubs and local authorities. The first is that model flying need not be inimical to the environment, and the second is that model flying and full sized flying can share the same airspace.

Dear Sir,

On Sunday March 8th a combined model and full size aircraft Fly-In was held at the fields of the Noarlunga District Radio Control Modellers and the South Coast Flying Club. As these clubs share adjacent locations in the environmentally sensitive Onkaparinga Estuary, the public were invited to attend and see first hand that aviation and conservation can co-exist.

Recent attempts to turn part of the flying clubs' land in the Estuary into a golf course were thwarted at a recent Council meeting only after considerable lobbying by both clubs. With support from some Council members, the golf course has been delayed indefinitely, and leases held by both flying clubs look secure for the future.

To raise the awareness of the general public of the activities of both flying clubs, the Fly-In demonstrated firstly that aircraft and models can be safely operated in close proximity, and secondly that people from all walks of life have an interest in aviation. Air Navigation Order 95.3 was organised through the then Dept. of Aviation to allow both types of aircraft at the one site, with full size aircraft having right of way over models. Special safety rules were adopted by the model club, and as there haven't been any incidents in the nine years that the clubs have been neighbours, the system obviously works well.

With a 1941 Boeing Stearman and 1949 de Havilland DHC-1 Chipmunk in residence at the aircraft site, other aircraft invited to appear on the day included two Austers, a Stampe, two Skyfoxes, a Druine Turbulent and a Volksplane. Visiting pilots arrived in a Cessna 210 and Cessna 182. The vintage and home-built aircraft executed a fly-past during the day and the public were permitted to inspect the aircraft at close range during the day.

With all aspects of RC model aircraft to display, flyers were chosen from many metropolitan and country clubs to demonstrate their models with the intention of getting flyers with good skills and a good range of models. The result was that there were 55 flyers invited to participate, and with 25 models in the static display area there were 80 models at the model flying site for most of the day. Two partly restored Tiger Moth fuselages were also in the static display area.

There were 12 displays of RC models, beginning with Civil Scale, and followed by FAI Aerobatics, Model Sailplane Tow Launch, Pre-1930 Military, Ducted Fan, Helicopter, Post-1930 Military, Electric Power, F3B & Thermal Glider, Scale Aerobatics, Old Timers and Pylon. With each group allotted 30 minutes to demonstrate their skills and models, the programme stayed on schedule even though there were a couple of incidents that forced quick changes. With a couple of models and flyers on stand-by, there were no gaps in the flying display.

The glider tug suffered a broken rudderpost when the tow-line caught on a rough patch of ground while landing and caused a rather humorous sudden reversal when the line became taut instantly. Hasty repairs and quick rescheduling had the tug back in operation later in the day.

The crowd, estimated at between two and three thousand, were treated to a good day's flying, with plenty to eat and drink and the chance to win rides in the Boeing Stearman or a Trial Instruction Flight donated by the South Coast Air Centre of Aldinga.

Weather conditions during the day were good, and once the sun had passed overhead the wind swung slightly to align itself with the north-south runway and the lighter weight models then didn't have to contend with crosswind take-offs and landings.

Commentary was provided on all events to enlighten the general public, with a specialist from each discipline invited to the microphone to give special comments.

The Fly-In certainly has increased the public's awareness, with visitors coming to each field, and some families picnicking and staying for the afternoon to watch the models and vintage aircraft. It was a good team effort, with flyers from many clubs making the trip with either model or full size aircraft, and all the visiting participants earned a big Thank You from the Noarlunga District Radio Modellers and the South Coast Flying Club.

Yours faithfully,
Rob Pratt, Reynella, SA.

★ ★

Dear Sir,

I am writing to comment on Don Howie's article on page 41 of Airborne No. 109.

My wife and I came to Australia 3 years ago, and after the first two years I became restless for something to do, especially as the fish were not biting too frequently. My wife suggested that I should take up art or marquetry. I did not think I could stomach either of those, and then she reminded me that forty years ago I had built a free flight model aeroplane.

Memories started to come back. Yes, I did build one from a kit; what it was called I have quite forgotten. It had a small engine with a fuel tank the size of one's thumb nail. On completion, and armed with the instructions, my wife and I finished on the top of Sussex Downs (UK) for the test flight. After launching by hand, it was supposed to fly in a large circle then land. However, it flew straight ahead and just got smaller and smaller. I can remember my eight year old son remarking quietly, "Is it supposed to do that, Dad?". The plane has never been seen again, and I didn't build another. I was 32 at the time, and that was nearly 40 years ago.

I paid a visit to the nearest model shop where, on recommendation, I purchased a Precedent Hi-Boy and a Hi-Tec PCM 550 radio set and, the most important thing of all, they gave me the phone number of Graham Brown, the President of the Central Coast Model Aero Flying Club. He signed me up as a member and introduced me to members who have now become good friends.

Don's article had a paragraph 'A Question of Age'. I only hope that retirees reading that will not be put off. It is obvious that a man of 65 years or over would find it difficult to cope with a Hustler. During the construction period of the Hi-Boy I paid regular weekend visits to our airfield and watched the flying, and really had doubts about whether I would cope with the Hi-Boy, let alone a Hustler. I was chatting to Mark Randall, one of the club's Gold Wing instructors, about my doubts of being able to cope. His advice was, forget the Hi-Boy and the Hustler and build a Sig Kadet Senior or, if that was too big for my car, then the Kadet Junior. I built the Senior with a 45 Magnum Pro installed, and I have not looked back. I now have 35 take-offs and 12 landings to my credit, but with Bob Marshall, my instructor, at my shoulder.

So, all you sixty and over potential Red Barons, take heart; it certainly is not too late. Join a club - this is the most important thing to

do. It wraps you with third partry insurance and gives you the help you need, plus lots of new friends.

I should add that I have had one monumental crash when the wing separated from the fuselage at around 250 feet, resulting in a write-off of the Kadet and a smashed engine. The accident was caused by using the rubber bands time and time again. Now I use them once only. Lots of encouraging words from the members present soon had me back at the work bench, and I was flying again the following weekend.

Yours faithfully,
Ben Reynolds, Bateau Bay, NSW.

The wing loading of the Hi-Boy is about 21 oz per sq ft, and that of the Hustler about the same, with a light engine and radio gear. The wing loading of the Kadet Senior is about 12 oz per sq ft. Full marks to Mark Randall for giving the right advice to a new pilot.

★ ★

Dear Sir,

I am writing to you in the hope that you will publish my letter, to demonstrate that good service and help still exist. My first venture into ducted fans, a Regal Eagle with a Rossi 90 and Byron fan, started very well with a copybook test flight, until the motor ran lean and, you guessed it, resulted in a cooked motor. The problem was due to a carby problem (the brass insert in the carby is a press fit) and this came loose during bench running. Several attempts were made to fix this before the first flight. After tapping a couple of small socket head bolts into the carby everything seemed OK. This was done because the shop that sold me the motor was not prepared to replacxe the carby because I had bought it approx 12 months earlier and suggested it had occurred due to incorrect operation and that I would have to buy another carby for around $150.00.

I then heard that Finescale Models had been appointed the new agents for Rossi engines, and I contacted Mr. Keith Baldwin. I was amazed at his willingness to help, even though his organisation was not responsible nor made the original sale. He asked me to send the engine to him and he would see what he could do. He contacted me soon after to advise me that the damage was rather severe, and offered to:

1. supply replacement parts at reduced prices; or
2. supply a new engine at a discounted price; or
3. send the engine back to Rossi for evaluation and warranty claim.

I chose the latter option and decided to take a chance and wait. Imagine my surprise when Mr. Baldwin rang me and said that he was personally taking the engine to Rossi on his trip to Europe in February.

On arriving at my office on 21/2/92 I found a Fax from Rossi direct to me with the following advice: "We have this day spoken with our Australian agent, Mr. Keith Baldwin of Finescale Models, regarding your Rossi 90 DF motor. On inspection we have decided to forward to you via our Australian agent a new model Rossi 90 DF motor, which will be ready for shipment mid March."

To Mr. Keith Baldwin and Rossi, thank you for your help and efforts in the above matter, and in particular special thanks to Keith. I hope all you modellers out there know where to go to purchase your Rossi motors, and that personal service and sincere help is still available.

Yours faithfully,
Wayne Miller, Seacombe Heights, SA.

Dear Sir,

I read with interest on page 10 of Airborne No. 110 the letter to you referring to the Viking model and Norm Stokes. Alan Gosbell was on the ball with his statements, and I can add a bit more fuel to the fire.

I remember the Viking model extremely well, as I was looking at it for a long time every day during a period in the early 1950s! It was hanging above my well-fed head in the old original Hearns Hobbies shop during my time of employment at that marvellous homely hobby haven.

It was entirely silver doped, with yellow and black trim and, in Air Force style, had huge roundels on each wingtip, except that these roundels were the old original Texaco trade mark decals and not military style ones or the later Caltex style. The little badge on each fuselage side was, if I recall correctly, the insignia of the old Victorian Model Power Plane Society.

Somehow or other Keith Hearn acquired the plane around the time that he opened the business, circa 1946-47, and there it hung as a showpiece for many years.

The late Reg Cooper, after doing the radio work in Jack Hearn's Nats' winning Rudderbug late in 1950 (4th Nats, at West Beach, Adelaide), professed interest in the big Viking and suggested installing an Anderson Spitfire 65 in it and using it for RC experiments. After winning Open Control Line Stunt at the 3rd Australian Nats in Melbourne in the Easter of 1950, interest in that had waned for Reg, and the big Spitfire was naught but a sleeping giant doing nothing.

The Hearn brothers readily agreed to the concept and, amid a cloud of dust, the big Viking was removed from the Hearn shop ceiling. Another sleeping giant! Being progressive hobby specialists, the Hearns' keen minds knew that RC was just around the corner for the masses, so hopped in on the ground floor.

So, the Viking flew on for a few years as Alan Gosbell outlined.

Reg also got from me the fuselage of my Lanzo Record Breaker pictured in Aeromodelling Digest 1991 on page 75. He was very keen on it as it was made entirely of genuine white Canadian spruce. He had plans for a supplementary plane to the Viking.

At the time of writing I don't know whether a plan ever existed for the Viking. Reg and I, unfortunately, lost contact with each other for a couple of decades. He was coming back into the game when I last saw him, constructing a big Bucker biplane for RC, which was only a short time before his death. That would have been ten or twelve years ago.

Finally, as I recall, Arthur Smith, pictured on page 4 of Airborne No. 110, helped Jack Hearn build the Rudderbug mentioned in paragraph 5 of this trip down memory lane.

Yours faithfully,
Monty Tyrrell, VH 13, SAM 375,
Life Member VMAA.

Thank you Monty. Who else can help to track down the Viking?

★ ★

Dear Sir,

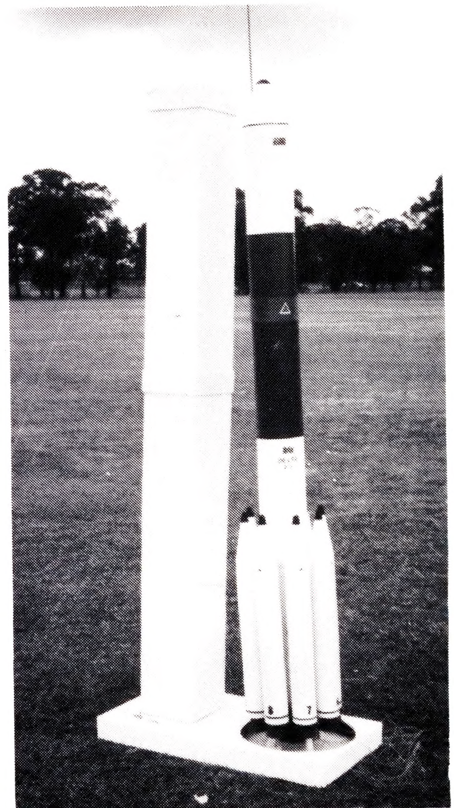
Our Doonside Aeromodellers' Club bought a relatively expensive steel tape with metrics on one face and imperial on the other. Taking mesurements to the nearest decimetre this shows that 16 ft 4 in is 5 metres (4.98) and 17 ft 7¾ in equals 5.4 metres (5.38).

This club has been privileged to see, over more than a third of a century, the loving attention to detail and micrometer accuracy of Ross Woodcock's splendid scale models, both RC and CL. Now, for the mesurements cited above, Ross gives 4.9 and 5.3 metres (No. 108, page 32).

Can it be that "Homer has nodded", or do we ask for a refund on our tape mesure?

Yours faithfully,
Ivor F, VH 1, Doonside Aero Club

The models and articles by Ross are the best. Perhaps he was not wearing his modelling spectacles when he jotted down the above figures.



Delta rocket has cluster of boosters that separate at BECO to allow main rocket to continue its trajectory. Model and photo by Victor Thornton. Anyone interested in rocketry may ring Victor on (02) 628 8281.

★ ★

Dear Sir,

Through the good offices of Mr. Bill Hannan of this locale, I have had the fun of reading the Nov-Dec 1991 issue of Airborne Magazine. As a reader of aircraft magazines since before 1935, I feel qualified to congratulate you. Keep up the good work. The sage's (or was it wit's? I forget) observation that Britain and America are two great nations separated by a common language no longer daunts me. Therefore, I find the articles well written and informative (though because of my ignorance of geography I may not realise fully just what the information means!).

One thing tweaked my WTE (Write The Editor) key, and this letter is the result. On page 97, the caption for the lower left photo (Stu Richmond's Playboy) includes the remark " ... folding propeller. Folders originated with rubber models; then moved to electrics ..." I beg to take gentle exception to the progression sequence. Folders, in point of fact, moved next to gas models!

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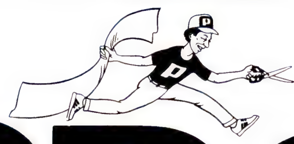

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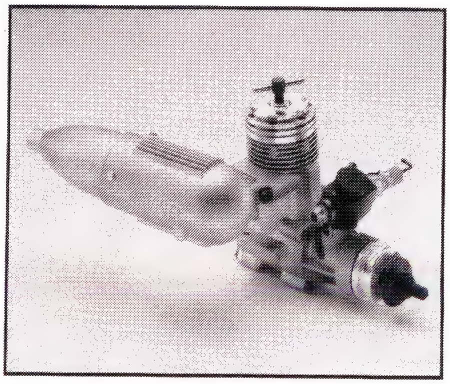


IRVINE

'POWER TORQUE'

40 ABC DIESEL

BORE:	20.57mm
STROKE	19.48mm
CAPACITY:	6.48cc
MAX POWER:	0.8 Bhp @ 1400 rpm
RPM RANGE:	2500 - 14000
PROPELLERS:	11 x 7 12 x 6 13 x 4 16 x 4

After the amazing success of the Irvine 20 ABC diesel the development of the 40 ABC diesel was pursued with great expectancy. Irvine totally redesigned the engine to bring the kind of performance to diesels which is normally associated with glow engines.
The specially designed, close tolerance, ABC piston/liner set has been optimised for low RPM running and high torque. The effortless way in which the IRVINE 40 DIESEL will turn even a 16 x 4 propeller is solid proof of its success. With and APC 11 x 7 propeller you would be hard pushed to tell the difference between the 40 diesel and its glow stablemate.
The old myth that diesels do not throttle is totally destroyed by this latest version of the acclaimed 'Jetstream', all metal carburettor which provides optimum mixture over the whole RPM range.
Add twin ball bearings and Schnuerle porting and you can see the kind of engine a modern diesel can be. What's more, you consume about half the fuel per flight!

Please see page 167 of Zaic's 1938 Year Book (if you are fortunate enough to have one handy; mine's an original!) for confirmation that F. Zaic and R. Marquardt came up with the idea some time between 1936 and 1938. There was even a series of gas model folding props put out commercially in the US during 1940 and 1941. Three sizes were available for the astronomical cost of $1.25 each (remember that a good fish and chips cost only $0.65 then). I used one on a 1941 Class A contest ship powered with an Ohlsson 19.

Two difficulties were never adequately addressed by the proponents of the folder. First, it was a beast of a job to start a reluctant engine by flipping from the hub (we didn't have electric starters). Second, the propeller had a distressing tendency to shed a blade in toto if it was interfered with in almost any way once running.

1991 World Champion, Sansui from Japan, with Mike Farnan of Model Engines, Australian agents for Kalt.
The Helicopter is a Kalt Agressor with an O.S. 61 RF engine with a K & S tuned silencer. Photo taken at the 1991 World Championships at Wangaratta.

At the contest where the aircraft mentioned above was my bright hope for a piece of hardware for the mantle, I cranked up, called "Timer" and launched for the mandatory ROG. An errant gust diverted my take-off from the cleared area and the wingtip struck a substantial weed, thereby reversing the flight path and making a substantial alteration to the trim settings. I leapt for safety, seeing impending interference with the possibility of posterity. The airplane wheeled over in a crash at the spot where I had been standing. A propeller blade, dislodged by the impact as indicated above, arced from the wreckage and impaled me. Fortunately my evasive action had left me facing away from the impact point so that the insult to my person was a deeper than superficial penetration of my left gluteus maximus at a critical altitude. I bear the scar on my posterior to this day, and have a pleasant family to attest to my prescience in turning away from the site of action.

I hope to see more of your fine product as time moves along. Unfortunately the economic realities of retirement in the 1990s on a fixed income preclude my subscribing. I've been forced to change from RC scale gas power to Peanuts, and am struggling to survive the transition to Pistachios. Several Peanut models can be built from the waste generated by one large scale model or RC soaring glider.

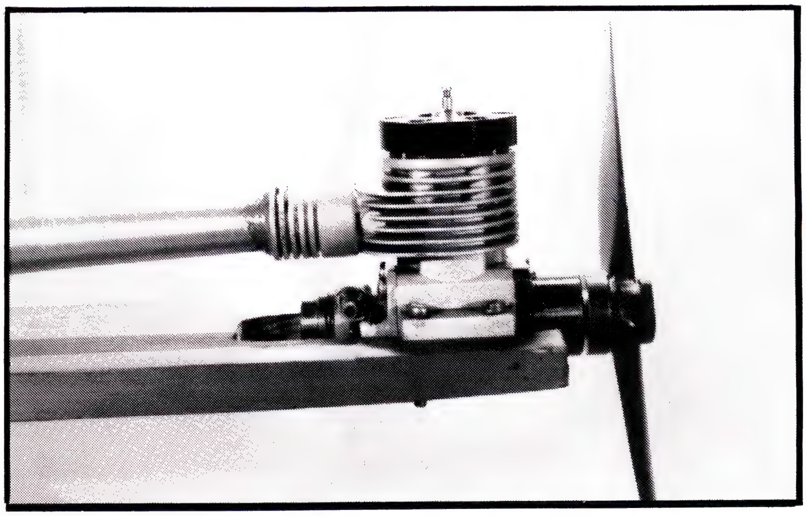
Yours faithfully,

Bill Kincheloe, Magalia, California.

Photo of wing of Martin Simons' Kirby Kite showing structure and bottom shape of wing section. Scale structure is most suitable for model. Could that be the Editor in the cockpit? Howie photos.

Engine Review

UCTKAM 1.5



HEED THE INSTRUCTIONS

Readers who have been with me for a while will know by now that I am a stickler for following the manufacturers' instructions for running an engine. In the case of the UCTKAM 1.5, best of luck! Fortunately for me, Ilya Leydman, the Australian importer, translated enough of the written instructions (11 A4 pages, no less) for me to get the swing of things and, when you purchase your engine from him he will do the same for you. I am assuming that, like me, you do not read technical Russian.

I have seen the occasional Russian engine from time to time, but I have never had the chance to run one or cast a very close eyeball over the working bits. All this changed when Ilya asked me if I would like to have a look at one of the range of engines he is bringing into the country. As I usually cater only for RC modellers in engine reports (I get what the agents or manufacturers send me), I considered that this would be a chance to look after the control line and free flight modellers, so I suggested the 1.5 speed engine with the tuned pipe.

What a surprise! The engine is stamped 7 (month) 1984 on the case, yet the design is right up to date, as is the performance. Ilya tells me that this engine is a first of the run; a sort of prototype, and the current run of engines on the way to him have many improvements. (I am satisfied with it as it is, so any improvements will be a bonus.) This also applies to the instructions, which are really a factory print that includes all the manufacturing specifications. (I have to believe him as the writing is all Dutch ...err, Rooshin to me.)

One of the sections that Ilya translated was the instructions for running-in. I'm glad he did, as it is quite specific, and without knowing that the engine requires a fair bit of bench time you might consider it a dud, as it takes a long time to sing a high pitched song. After a lot of running and bringing the revs up by leaning the needle, the pipe suddenly cut in. The pipe has a broad tuning band and I was able to wind in yet another ¾ of a turn to full pitch. The exhaust note sounded like an angry bee in a bottle.

With the tuning in mind I was really surprised at the size of the jet hole in the spray bar; how about 1.5 mm? This great hole feeds four smaller holes in a peripheral jetted venturi that is 4 mm diameter at the waist section. These and other surprises await us, so let's exlore the Bolshoi Beast without further ado.

CASTINGS

Cast components are the maincase, comprising an open ended crankcase, barrel, rear exhaust manifold and mounting lugs; one crankcase end which is also the rotary drum valve housing (bronze bushed); fuel system housing; and the piston. All the cast work is quite good quality, with a robust design, and appears to be manually machined (as opposed to CNC - Computer Numerically Controlled machining as seen on most engines today). Machining quality is adequate, threads are clean and sharp, and surfaces mate well, although the use of soft aluminmium gaskets is common throughout. There is evidence of a high silicon content in the alloy, particularly the piston, but this can be seen only in the machined surfaces, as all external surfaces have been bead blasted to give a satin finish.

I didn't mention the other housing, the front (?) - depends on the use of the engine as the configuration of the engine can be changed, say, for a boat or tethered car, in which case the crankshaft comes out the rear(?) of the engine under the tuned pipe. Whatever pleases you. Thing is ... the crankshaft housing is machined from bar stock ... STEEL! Why ask me? I don't know. The housing and the two ball races weigh 35 grams, which is 1/5 the total weight of the engine. Perhaps the machinist had the same knowledge of Russian as I have and took 'bnhtob' on the blueprint to mean steel. One thing is sure; you're not going to bend it.

SPECIFICATIONS

Bore:	**13.15 mm**
Stroke:	**11 mm**
Displacement:	**1.493 cc**
Max RPM:	**26,000**
Stated Power:	**0.4 kW**
Weight (with tuned pipe):	**175 gram**
Fuel	**4:1 methanol & castor oil**
Plug:	**Rossi button**
Prop:	**6 x 3**
Design Use:	**Control Line Speed Competition Free Flight**
Direction of Rotation:	**Both**

LINER AND PISTONOVITCH

Yes, well ... the piston is cast from high silicon-aluminium alloy, and is barrel shaped in longitudinal section (end to end). The top of the piston tapers in about 1/10 of a millimetre for a distance of 2 mm. The contact section is about 4 mm wide and the rest of the skirt tapers in slightly. When the engine is cold there is only the 4 mm band in contact with the liner for easy starting and, as the engine runs up to operating temperature, the piston crown expands and the compression builds up slightly. The liner is also tapered in at the top, but the barrelled piston eased the nip over top dead centre; very cunning!

The gudgeon pin is hollow but blank on one end to stop connecting the exhaust port with the rear boost port. It is retained by two wire circlips and is fully floating - moves in the piston and the little end of the conrod. The conrod is fully machined and quite sturdy, possibly the largest section rod that I have seen in an engine this small. The engine is designed to run fast, so I suppose they put in a little bit of insurance agains rod failure.

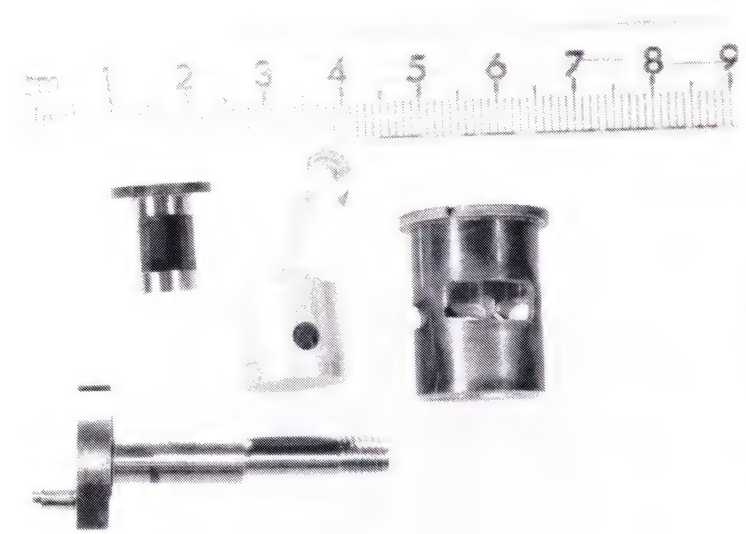
The liner is thick section brass with a heavy coat of chrome plating. The fine finish suggests that the bore has been diamond lapped to finish size. They have done a good job here as the piston slides up and down the bore as slick as a foot on a banana skin, with both components dry, that is, no lubrication or fuel.

CRANKSHAFT AND DRUM

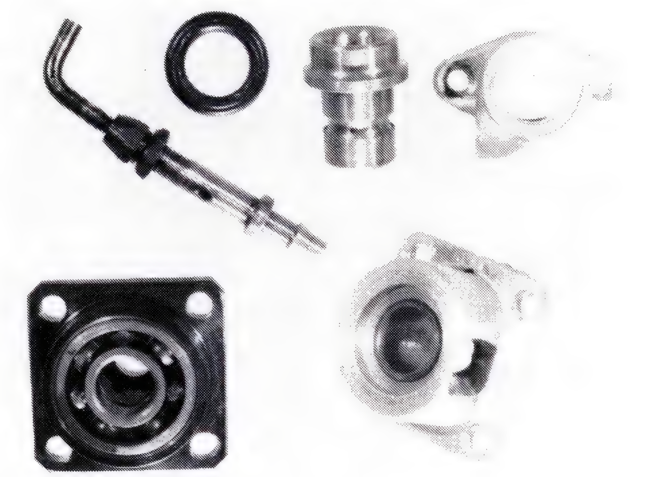
These two components are machined from a steel alloy, hardened right out and fine ground on all the working surfaces. The ground surfaces are excellent, with a finish like polished chrome. All changes in diameter are largely radiused, and the drum valve has a reduced diameter in the centre to lessen the bearing contact for less friction drag. The driven disc on the drum has two slots to allow for running the engine in either direction (alters the fuel timing). The prop driver has straight lines for gripping, as opposed to radial knurling, and is locked on the shaft by the tapered split collet method, which is rare for a small engine. The prop nut is a T nut with two flats cut out on the large diameter, and the leg of the T fits inside the prop hub.

FROM THE TOP

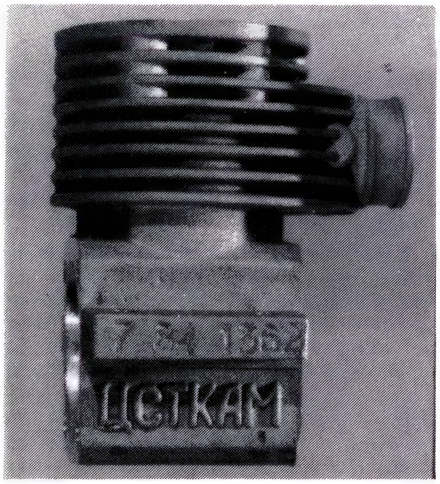
The head is in two parts and comprises a thick aluminium washer with 5 counter-bored holes around the centre hole, and this clamps down a Rossi glow plug button. One aluminium washer is used under the rim of the plug and, no doubt, rev-heads will experiment with this washer in an attempt to gain more rpm.



Small parts of high quality. Shiny band is top relief on piston.



The black item is the steel housing for the shaft. The rest of the bits make up the fuel system.



Very rugged cast crankcase for the UCTKAM. See the date imprint?

IN AND OUT

The fuel system is a spray bar and peripheral venturi system. The venturi insert is anodised red, sealed with an O ring, and the air passage is as smooth as a bald-headed billiard ball. The brass spraybar has a chuck nut on the threaded end which can be tightened to retain the 90° bent needle bar.

Exhaust is by a fixed length tuned pipe which is an optional extra to the purchase of the engine. The pipe seals over a high temperature O ring on the stepped outlet from the barrel, but is not retained in any way. A bracket on the stinger to the fuselage or hull of the model is required. The pipe is quite broad in tuning, and works very well in both coming on song and reducing the intensity of the exhaust sound.

THE SONG

The instructions indicate that the engine MUST be run-in on 3:1 fuel for a period of 8 to 10 minutes at 8 to 10,000 rpm, then 8 to 10 minutes at 15 to 17,000 rpm, then 10 to 15 minutes at 24 to 25,000 rpm, then 4:1 fuel until maximum speed can be held. I found that the test engine required about 15 minutes on 4:1 fuel, with a gradual leaning of the mixture until the pipe cut in and the engine would run happily at full rpm without any signs of sagging.

Actually, it is a very pleasant little engine with no vices, and us quite happy to start by hand if you give the prop a smart flick. I ran the engine with a 6 x 3 Zingali prop at 25,000 rpm, and at 25,500 rpm with a Power Prop wood, which is a credible performance that will move your yo-yo fast enough to make you giddy, or send your free flight model fair up the tail-feathers of a super fast hawk. A fun machine with serious potential.

The test engine was supplied by Ilya Leydman, trading as **Eastcam, at 1/168 Hastings Parade, Bondi, NSW, 2026; phone (02) 30 6805.** Ilya has a range of Russian engines and spare parts, from 1.5 cc to 10 cc, in glow and diesel, air-cooled and marine, and he will be happy to talk business with you.

The Airborne Engin·ear

by Brian Winch 33 Hillview Parade, Lurnea, NSW, 2170

THE OILY HAND YET AGAIN

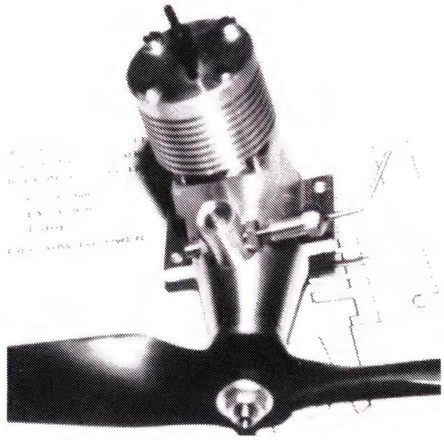
Following the discussion of oils and engines in the previous issue, I have been aware from letters and comments over many years now that many readers have a super engine, or two. These are not the $100 out-of-the-box jobs, but twin, four or even five pot four-strokes. Having recovered from the trauma to your wallet (or arm or leg) in obtaining that beautiful beastie, you should have considered how best to look after it; assuming, of course, that you are going to run it!

Okay then, you have decided to take the advice I gave in the last issue, but now you have a problem. You have a drum of fuel with 10% oil and you wish to bring it up to 20%. How much oil should you add? For the sake of selecting a number, I am going to consider that you have 2 litres of fuel in each of the following situations. The 2 litres is purely an example and the mathematical formulae will work for any amount. With me?

Right ... we have 2 litres of fuel with 10% oil and we want 20% oil. Simple! When we mixed up the 2 lires initially, we measured 200 ml of oil and 1800 ml of methanol to give a total of 2,000 ml - 2 litres. Well, let us add the same amount of oil, 200 ml, and we now have ... 2,200 ml. Err ... all up we now have 400 ml of oil but that is not 20% of 2,200 ml. Perhaps we should have added 220 ml? Perhaps not! The same problem would occur. Perhaps I should have bread and jam for lunch or do rabbits mate in winter? Confusing, isn't it? No matter how much we add, the same problem will eventuate, unless we can work backwards or come up with some formula that will give us the total amount before we work out the additional amount. Yah! Bats in your belfry, ants up your nose and ferrets in your trousers. Let's have a cup of castor ... err ... tea and think about this. While you are dunking your bikkie, have a peep at what I have worked out for you to stop all this nonesense AND ... free with this issue ... the Winch Fuel Proportion Ratio Chart. Make a copy of this chart and treasure it, as it will save you a lot of hair pulling some time in the future. You will need to refer to this chart for fuel ratios and also to check the formula that I am about to expound. Here we go!

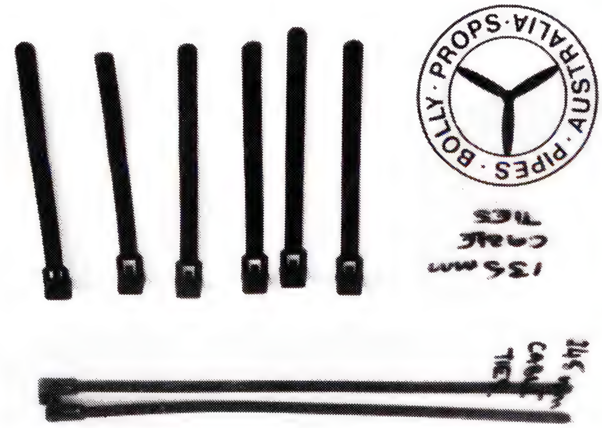
Keep it in mind that we want 20% of the TOTAL amount. Using our 2,000 ml of 10% fuel that we wish to remix to 20%, we have to add 10% to the total amount, but will that then give us the correct proportion? Try this method: We need to add another 10% oil and, checking our chart, we see that 10% equals 9:1 (9 parts methanol to 1 part oil), so we need to find what 1/9 is of 2000. To save the batteries in your digital pencil, I have worked it out and the answer is 222.2 repeater, so let's make it in our favour and say 223. This is the 1 part of the 9:1 ratio of 2,000. Okay ... we add 223 ml of oil and we now have a total amount of 2223 ml of mixed fuel. If we divide 223 by 2223 and multiply by 100 we arrive at 10.03%, which would appear to be correct as we wanted 10% more oil. Going back, we wanted, finally, 20% oil content in the fuel. We had 200 ml initially, added 223 ml giving a total of 423 ml. So divide 423 by 2223 and multiply by 100 and we end up with ... 19.02% ... Yah! Me Tarzan and you Jane - me go swing through the strawberry patch. Hold on ... let's get a bit of sanity into this thing. How about we tip all the 10% fuel down the path to kill the weeds and start from taws ... half a mo! That's it .. we start from the beginning.

Try this. We had 2,000 ml of fuel made up of 200 ml oil (10%) and 1800 ml methanol. We want 20% oil so, if we had mixed this from the start we would have had 400 ml of oil and 1600 ml of methanol ... we have 200 ml of methanol too much. So? Add oil to that as well. Again, from our chart we see that 20% is 4:1, so we divide the 200 by 4 and arrive at 50 which is the 1 part of a 4:1 mix when we have 200 ml methanol. You

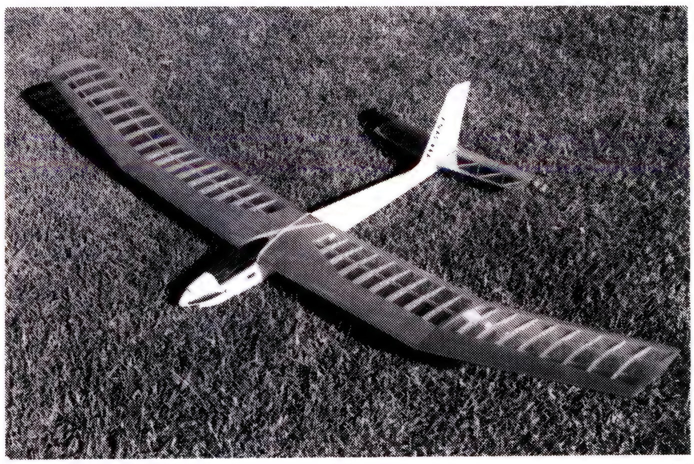


A 2 cc Mate diesel built from the Owen Delta kit by Stan Daroche. Starts easily and turns a Taipan 8 x 6 at 10,000 rpm. Photo by Michael Devine and sent in by Norman Bainbridge.

can see that we can't take 20% of 200 because we already have the 200 ml established and that amount cannot be reduced. Okay, we now have the original 200 ml of oil, the added 200 ml plus an extra 50 ml for a total of 450 ml. Right then, the proof. (If this doesn't work out I'm going to take up navel fluff collecting.) Here we go: 450 divided by 2250 (our new total) multiplied by 100 and we have ... ra ta ta ... 20% (at bluddy last). Let's run it again simply. Total amount of fuel = 2,000 ml, with 10% oil = 200 ml oil and 1800 ml methanol. If we had made it 20% oil we would have had 400ml oil and 1600 ml methanol. We have 200 ml methanol too much so we add 20% oil for this as well. From the chart we see that 20% = 4:1 so we would need to add 50 ml of oil to make 20% of the outstanding 200 ml. We now have a total of 450 ml of oil, a total of 2250 ml of fuel, and 450 represents 20% of that amount.



Bolly has got the business of fixing a pipe or muffler all tied up. He has everything available for both ends of the engine: props up front and headers and pipes to the rear. This makes it easy to fit your engine with the best equipment for performance and noise reduction. Get a Bolly book for all the details.



Goldberg Electra by Don Howie. Stock 540 motor, 1200 mAh buggy battery, 7 x 3 Kyosho folding prop. Hi-Tec radio with BEC switch and brake. Two piece wing is large and strong. Slow climbs and good glide. Electra owners find that the canopy hold-down and motor mount need improvement.

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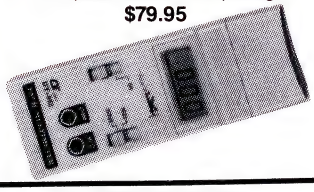

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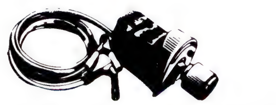

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SPECIFICATIONS: Length 1 metre; Beam 220 mm; Height 1750 mm; Sail Area 3870 sq cm; Weight 33 kg.

FEATURES: ABS Hull inner and main deck, already completed; Internal fin keel case bonded into hull; High performance detachable ABS fin keel; Low drag Hydrodynamic leaf ballast; Light and strong fibreglass mast and booms; High performance Australian made mylar/kevlar racing sails; Sail and hull decals supplied; National flags and sail numbers of 10 countries supplied; Wooden display stand kit supplied, inc brass nuts and bolts, predrilled for easy assembly; Cup Racer can be controlled by most 2 Ch RC sets (not supplied); Detailed instruction Book provided.

Form a group with other Cup Racers and stage your own Regattas as a 'One Design Class' Racing Fleet!

GLO STARTER WITH CHARGER

(As reviewed by Brian Winch)

$37.95

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3 position switch for Hot, Off & Cool. Approved lead. Ideal for heat-shrink plastic films.

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Charge 1-9 cells at 100 - 4000 mAh Capacity. Charges all T/X and R/X packs inc. 7.2V 1200/1700 mAh Packs.

Dial up your own charge rate and charge two seperate packs at different rates at once **$74.95**

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SC ENGINES

SC 12A ABC FSR RC w/muffler ... **$74.00**
SC 12C ABC FSR RC w/muffler (car) ... *
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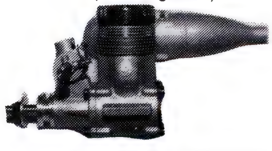
SC 12M ABC FSR RC w/muffler (marine) *
SC 12MX ABC FSR RC w/muffler (marine, pull start) .... *
SC 15A ABC FSR RC w/muffler .. **$88.00**
SC 15CL ABC FSR w/muffler (control line) *
SC 25A ABC FSR RC w/muffler .. **$96.00**
SC 32A ABC FSR RC w/muffler . **$105.00**
SC 32H ABC FSR RC w/muff (heli) **$105.00**
SC 40A ABC FSR RC w/muffler .. **$99.00**
SC 46A ABC FSR RC w/muffler .. **$117.00**
SC 53A ABC FSR RC w/muffler .. **$127.00**
SC 61A ABC FSR RC w/muffler .. **$129.00**
SC 61CL ABC FSR w/muff (control line) *
SC 61H ABC FSR RC w/muffler (heli) **$129.00**
SC 75A ABC FSR RC w/muffler .. **$157.00**
SC 75H ABC FSR RC w/muffler (heli) .. *
SC 91A ABC FSR RC w/muffler .. **$168.00**
SC 108A ABC FSR RC w/muffler . **$199.00**

Four Cycle SC Engines

SC 65A ABC w/muffler .... *
SC 80AR Ring w/muffler .... *

(* Coming Soon)



SAITO 4-STROKE ENGINES

FA-40S; .55 Hp **$219.00**
FA-45S; .7 Hp **$245.00**
FA-50; .85 HP **$279.00**
FA-50 GK; .85 Hp **$299.00**
FA-60T; .9 HP Twin **$849.00**
FA-65; .96 HP **$295.00**
FA-65 GK; .95 HP **$329.00**
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FA-80 GK; 1.3 HP **$369.00**
FA-90T; 1.0 HP Twin **$599.00**
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Tailwheel Assembly, Fittings, Plugs and Spare Parts Available!!

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.82 Inboard Marine **$429.00**
7.7 Ducted Fan **$279.00**
.82 Ducted Fan **$429.00**

THE HOBBY HEADQUARTERS PTY LTD IS THE FACTORY APPROVED AGENT, SPARE PARTS AND SERVICE CENTRE FOR S.C., SAITO AND K&B ENGINES.

THE HOBBY HEADQUARTERS "SUPER DROP" RANGE OF 2 and 4 CYCLE MODEL ENGINE GLO FUELS ARE NOW AVAILABLE.

These surprisingly low priced fuels are manufactured to the very highest standard and contain the finest grade components available. All "SUPER DROP" fuels contain:

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- Highest Grade Synthetic Lubricants
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ASSURE YOURSELF OF ENGINE LONGEVITY WITH THE ULTIMATE IN PERFORMANCE!

All Fuel Components measured by Volume, not by Weight!

Custom mixes made to order .... Car, Aircraft, Boats and Helis.

	1 Litre	2.5 Litre	5 Litre	20 Litre
2-Stroke				
FAI	$4.75	$8.75	$15.00	54.50
5% Nitro	$6.10	$12.00	$21.50	$79.90
10% Nitro	$7.15	$14.60	$26.60	$99.95
4-Stroke				
0% Nitro	$4.75	$8.75	$15.20	$54.80
5% Nitro	$5.90	$11.60	$20.80	$77.20
10% Nitro	$6.95	$14.25	$25.95	$98.00

205 Litre containers available. **Our fuels are blended, not mixed!**

Australia wide special freight rates have been negotiated for fuels.

HHQ BALL RACED SERVO

The new HHQ double ball-raced servo has 2.6 kg-cm torque, .22sec/60°, case 36 x 19.5 x 40 mm (HWL),

Excellent value at .... **$26.50** each
or 4 for **$99.95**

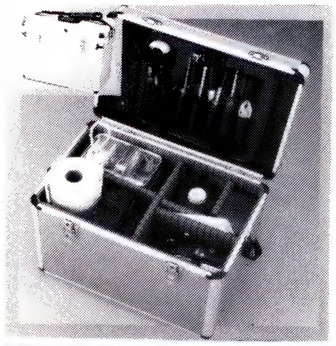
HEAT SEALING IRON

with non-stick coating, approved lead, upswept front, tapered and rounded sides for perfect bonding, specially designed thermostat and pointed, cone-shaped nose for hard to reach areas; complete with stand **$36.95**

HHQ CUSTOM FLIGHT BOX

Give your equipment a great place to live!!! The sophisticated modeller will appreciate these cases with and stylish aluminium outer skin, with foam-lined mahogany interior.

.... **$119.95**



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The deluxe fibreglass aircraft kits are superbly finished with lightweight fibreglass fuslages; All bulkheads and engine mount installed. Wings and stabiliser of contest grade balsa sheeted foam (where applicable); Leading and trailing edges fitted, all flying surfaces cut out and shaped, all hardware including wheels and tank supplied (except ¼ scale Cap 21).

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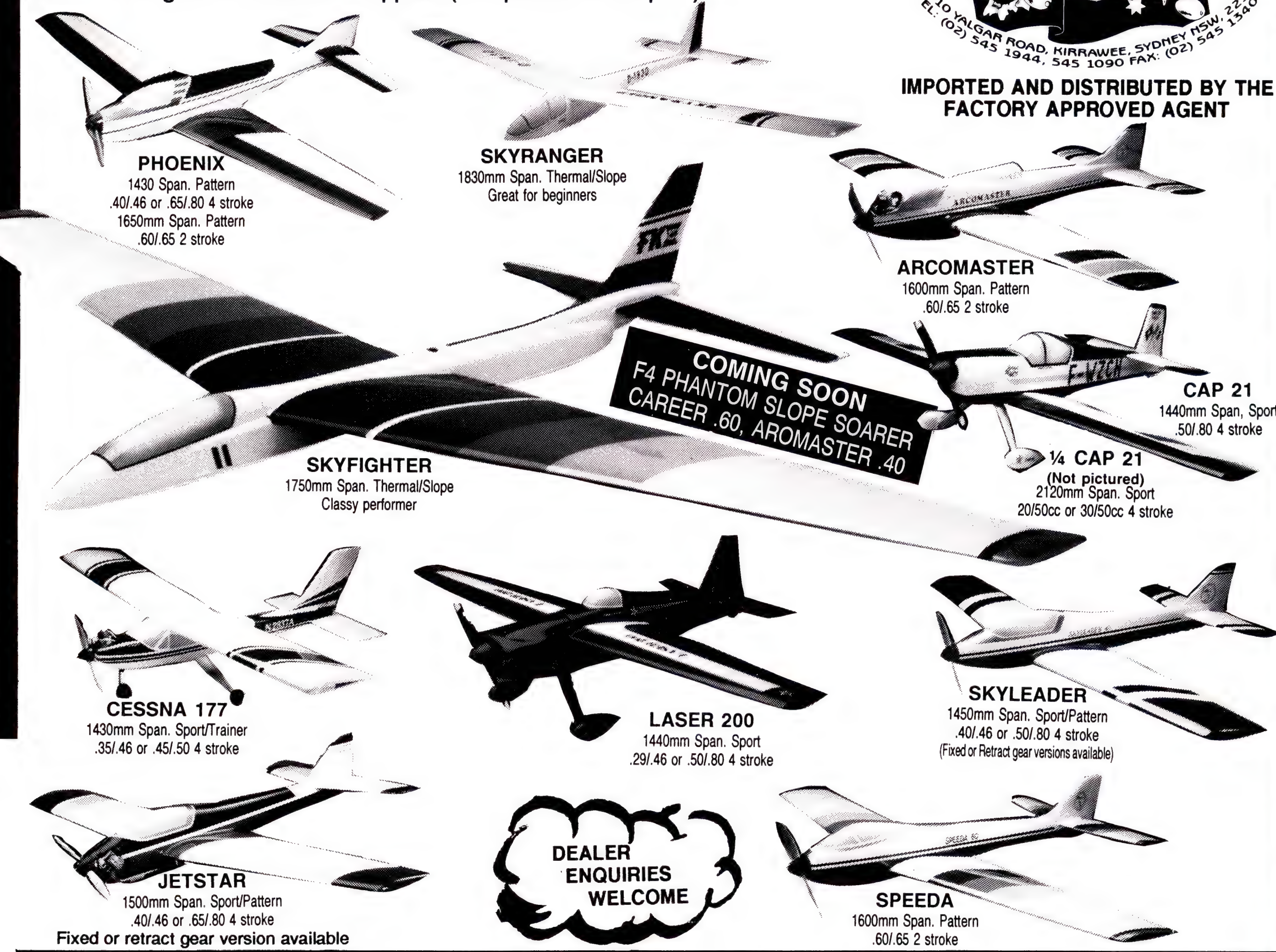
IMPORTED AND DISTRIBUTED BY THE FACTORY APPROVED AGENT



PHOENIX
1430 Span. Pattern
.40/.46 or .65/.80 4 stroke
1650mm Span. Pattern
.60/.65 2 stroke

SKYRANGER
1830mm Span. Thermal/Slope
Great for beginners

ARCOMASTER
1600mm Span. Pattern
.60/.65 2 stroke

COMING SOON
F4 PHANTOM SLOPE SOARER
CAREER .60, AROMASTER .40

CAP 21
1440mm Span, Sport
.50/.80 4 stroke

¼ CAP 21
(Not pictured)
2120mm Span. Sport
20/50cc or 30/50cc 4 stroke

SKYFIGHTER
1750mm Span. Thermal/Slope
Classy performer

CESSNA 177
1430mm Span. Sport/Trainer
.35/.46 or .45/.50 4 stroke

LASER 200
1440mm Span. Sport
.29/.46 or .50/.80 4 stroke

SKYLEADER
1450mm Span. Sport/Pattern
.40/.46 or .50/.80 4 stroke
(Fixed or Retract gear versions available)

JETSTAR
1500mm Span. Sport/Pattern
.40/.46 or .65/.80 4 stroke
Fixed or retract gear version available

DEALER ENQUIRIES WELCOME

SPEEDA
1600mm Span. Pattern
.60/.65 2 stroke

Yellow Aircraft 1/5 Scale MK XIV SPITFIRE
This kit can only be described as magnificent

$749.00

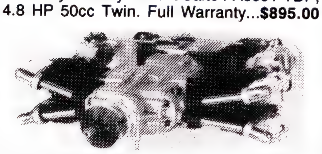
KIT FEATURES: Joined one-piece glass fuse with firewall and formers installed; separately moulded glass cowl, manifolds, cannons, carb. inlet, blisters and tailwheel and door; elliptical foam core wings with split flap openings, pre-sheeted with contest grade balsa; ailerons and flap servo opening pre-cut in wing; one-piece moulded glass elliptical stabiliser with ribs installed; vacuum-formed clear canopy. OPTIONAL EXTRAS AVAILABLE NOW: Aluminium machined main landing gear with functional oleo struts and pneumatic support equipment; machined aluminium 5 spoke wheels and 5 inch tyres; scale 5⅝ inch diam. spinner with machined aluminium backing plate; retractable pneumatic tail wheel; Decals.
KIT SPECIFICATIONS: Length 78 inch; Span 88 inch; Weight 16-19 lb; Engine ST 2500 and up.
***Coming Soon:* 1/5 Zero and 1/6 P38 Lightning!!**

Pica 1/5 Scale P51D MUSTANG
Cripes, a 'MIGHTY III'

Span 88 inches, Weight 15-18 lb. **$469.00**

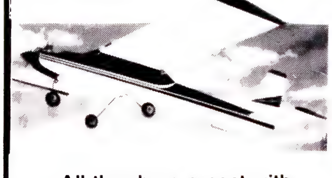
KIT FEATURES: Pre-formed canopy; pre-formed ABS cowl; pre-formed air scoop; built-up tail surfaces; two full sized printed plans; pre-formed steel landing gear; pressure sensitive mylar decals; construction booklet with isometrics; all balsa and light plywood construction; main gear and tail wheel retract installation.
Spinners and retracts now available.

One only Factory re-built Saito FA300T-TDP, 4.8 HP 50cc Twin. Full Warranty...**$895.00**



BEGINNERS SPECIAL

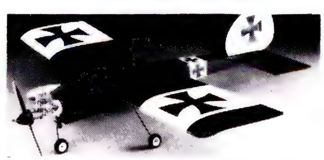
*** Sanwa Vanguard 4 Ch RC Set with Reversing, Nicads, Charger, 4 Servos;**
*** SC .46 ABC SF RC Engine**
$589.00



All the above except with
*** Western Trainer 40 balsa kit**
$459.00

J'TEC PRECISION CAST VIRGIN ALUMINIUM ENGINE MOUNTS, MUFFLERS & TEST STANDS.
To Suit Almost Any Engine. Call Us!!!!!

DAS UGLY STICK



These beautifully finished Ready To Fly Aircraft require only the basic components to be assembled. Fully finished heavy duty shrink covering over substantial balsa and ply air-frame. All hardware and instructions supplied.
You can be flying in a few hours.

.40 size; 1381 mm span (.65/.80 4C)	**$219.00**
.60 size; 1565 mm span (.80/.90 4C)	**$249.00**

SPECIAL COMBO DEAL

.40 Ugly Stick with SC .46 SF ABC	**$309.00**
.60 Ugly Stick with SC .61 SF ABC	**$349.00**

NEW!! EXTRA HEAVY DUTY HI-TEMP SILICONE TUBING
Excellent for those tricky exhaust systems ... Nitro Fuels and Hi-Temp applications. 19 mm I.D., 28 mm O.D. - suit tuned pipes, headers etc., .60 size and up.
$23.95 per 300 mm

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Up to $9.99	**$3.00**
$10.00 to $24.99	**$4.00**
$25.00 to $49.99	**$5.00**
$50.00 to $99.99	**$8.00**
$100 to $199.99	**$10.00**
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Goods $100 and up automatically insured at no extra cost. Larger and inflammable items may be extra.
Call or fax us for confirmation.
All goods shipped at cost!!
No C.O.D. on road freight.

PHONE OR FAX YOUR ORDER CHEQUE, MONEY ORDER, C.O.D., BANKCARD, VISA, MASTERCARD, LAYBY

Further Complications

After all that you now tell me that you want to add 10% nitro as well. ('Scuse me sir, do you have any spare navel fluff?.) Okay, back to basics again, and let's keep it simple. We have 2,000 ml of fuel at 20%, so we have a mixture of 400 ml oil and 1600 ml methanol. The nitro takes the place of methanol so, if we had made the mix with 10% nitro initially, we would have had only 1400 ml of methanol, so we end up with 200 ml extra methanol which now needs 10% nitro AND 20% oil. Right, it has to be nitro first so we check our chart for 10% as we see it is 9:1 so we need to add 23 ml nitro (200 divided by 9 = 22.2 - our way, 23). We now have 223 ml of fuel requiring oil at 20%, so we check and see that 20% is 4:1, so we divide 223 by 4 and we arrive at 56 so we add 56 ml oil. Proof? The total amount is now 279, which we divide into 56 and multiply by 100 to give 20.07%. Close enough? Our final mix now has 456 ml oil, 223 ml nitro and 1600 ml methanol to give a total of 2279 ml, and if you prove those figures by dividing the 456 ml oil by 2279 and the 223 ml nitro by 2279 and multiplying each by 100 you should get a surprise.

You can use this method to work out imperial measure also, but it is not as easy as with the decimal system when you check your working. With the decimal system you really don't have to calculate so much as, at a certain point you can see the answer and you only need to move the decimal point 2 places to the left for the full answer. You will have to work the imperial system right out and, to give you a start and jog your memory, one pint is 20 fluid ounces and one gallon is 160 fluid ounces. Quick as a flash we see that there are 8 pints in a gallon, not to mention quarts. ("What's a quart?" asks one of our junior readers. In case Dad's forgotten ... 2 pints.)

From the Beginning

So that we don't have to go through all that ciphering again (well, it was secret writing until I told you), let us resolve to do it correctly from the start. In case you have problems calculating, here are the amounts of each ingredient for our 2,000 ml or 2 litres of fuel with 10% nitro and 20% oil right from the cans to the mixing container.

	10% nitro	=	200 ml
	20% oil	=	400 ml
	70% methanol	=	1400 ml
TOTAL	100% fuel	=	2000 ml

Are you sure that you now understand the adding bit mathematics? Want me to go through it again? NO? Okay; I was only checking. (Do you have any fluff?)

The shape of props to come. The Supercool 12¼ x 11 and 13 x 12 for F3A are hot! Note side lugs on hub ground down to give lateral balance.

THE CHART

The B. Winch Fuel Calculation Chart Free To All Readers

Percentage	Ratio
28	2.5 : 1
25	3:1
22	3.5:1
20	4:1
18	4.5:1
15	5.6:1
12	7.3:1
10	9:1
8	11.5:1
5	19:1
2.5	39:1
2	49:1
1	99:1

The last three are for diesel engines when adding a cetane improver.

What's New?

Items checked and tested by the ENGIN-EAR to keep you up to date with quality products

The **Great Vigor Models Co.** (some name!) has produced a **Cross Brace** with the improvements that put it in the lead for design. The sockets are 7, 8, 10 & 12 mm, and these sizes fit a host of modelling nuts. (No - not the flyers - the metal nuts on the engines.) The almost universal crankshaft nut for medium engines is ¼ x 28 UNF, and the M10 socket fits these and several metric nuts in use. The M12 fits 5/16 x 24 UNF as found on larger engines, and the M7 fits most small engine nuts. The M8 is for glow plugs and it is the longest arm. This cunning design means that plugs in cowls can be reached and the long arm also serves as the lever for the large nut sockets. Inside the M8 is a silicone sleeve that grips the plug and retains it in the socket for removal. In between the four arms are flats on the hub section and these flats are drilled and tapped for your spare glow plugs. Very neat idea.

How many **Servos** are enough? I tend to gather servos - once-only special deals, introductory offers, good second-hand units, birthday and Chrissy pressies and any other way I can. I have recently increased my hoard by one. This unit is the **TK-S03** (oilite bearing or ballrace) which is the house special from Hobby HQ. I am very impressed by this servo after considerable testing in an effort to destroy it (within reasonable use parameters) and finding that it finished as good as new. Another factor is that you can purchase one and have change from $20 for the oilite bearing unit, and change from $27 for the double ball race unit. A discount is given on purchase of 4 or more, and a good margin is available to dealers for volume orders. I tested the servo on 4.8 Volts (NOT 6 Volts as in some test reports I have seen), for the following figures:

Pulse width:	1.5 ms
Signal:	Positive pulse (suit 90% of radios)
Travel:	60° each way (v. good travel distance)
Load:	Lifted 3 kg for full travel. Good figure!
Weight:	46 gr
Output shaft:	Futaba spline
Connector:	Futaba; remove side tab to suit S connector (JR, H-Tec etc.)

Complete with cross output arm and mounting equipment. Buy 12 and get a baker's dozen.

While we're on shop name specials, the same shop has a range of those super-light, low bounce foam wheels with the super-strong hubs. These are top wheels for all applications, and they carry no weight penalty - a pair of 60 mm diameter tip the scales at 38 gr (1 ounce)! Available in 40, 45, 50 & 60 mm diameters, and buy 'em as you want 'em; one or two or three, whatever takes your fancy. Super value!

I've seen so many ideas for **Hatch Catches** that I thought my education was complete. Then along comes the **Fourmost Flush Button Release.** Lovely little unit that fits flush with the surface (can be painted), and a little finger pressure is all that is needed to release it. No chance of this unit letting go without being pressed, and two screws (supplied) and a drop of Zap (typical) will have it installed in a wink ... err, ... in a model. Neat!

I thought of this years ago, but the cost of an extrusion die gave me premature grey hair with shock. What I had in mind was to make a long bar in the shape of an **Engine Mount** and cut off the chunks as needed - the only way to go. Sig came up with the same idea AND had the necessary finance, so I'm back peddling encike ... enkyc ... ensic ... books of knowledge to make a quid. There are two sizes, to suit .19 to .60 and .75 and over, and they ARE cut from an extruded section in single units. Dead true, dead light and dead easy to use at a price to beat the complete units. If you have a set of these in both sizes you have a mount to suit any engine from .19 up.

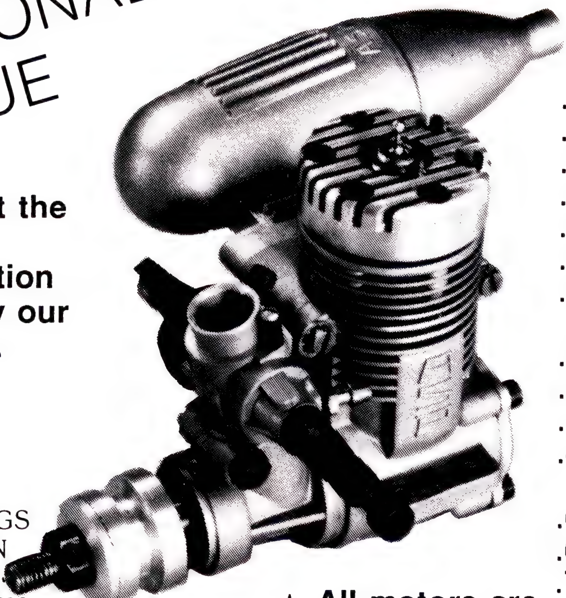
When live hinges came on the market I tossed out all my pinned hinges. When **Sig Easy Hinges**

2 YEAR WARRANTY

Warranty Card Included
(Excluding Blackhead Series and Diesels)

A.S.P.

SENSATIONAL VALUE



WARNING. Any motor without the official Australian Model Aerodrome warranty registration card WILL NOT be covered by our exclusive 2 year warranty.

MODELS AVAILABLE

.12 FSR ABC
.15 FSR ABC
.25 FSR ABC
.28 FSR ABC
.32 FSR ABC
.40 ABC BLACKHEAD
.40 FSR ABC DIESEL CONVERSION
.40 FSR ABC
.46 FSR ABC
.46 ABC BLACKHEAD
.46 FSR ABC DIESEL CONVERSION
.61 FSR ABC
.61 FSR RINGED
.75 FSR ABC
.91 FSR ABC
108 FSR ABC

FEATURES:
- ★ SCHNUERLE PORTED DESIGN
- ★ TWIN HIGH SPEED BALL BEARINGS
- ★ HIGH SILICONE CONTENT PISTON
- ★ HARD CHROME-PLATED LINER
- ★ ADVANCED CARBURETTOR DESIGN
- ★ TOP PERFORMANCE ON "STRAIGHT FUEL"

★ All motors are fully ballraced

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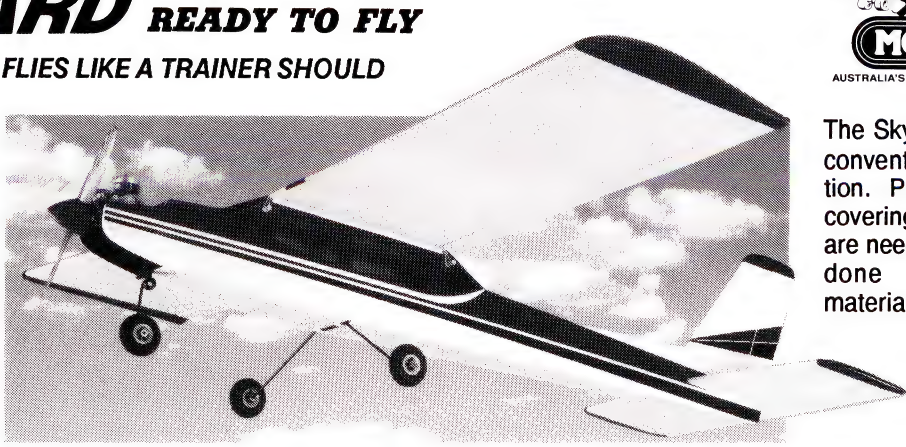
ABC MODELS
AUSTRALIA'S LEADING HOBBY STORES

FLIES LIKE A TRAINER SHOULD

All parts and accessories included wheels, tank, rods, glue etx. Just add: 40 size motor and 4 channel radio and start learning.



The Skyward 40 is of a conventional construction. Ply/Balsa Shrink covering. So if repairs are needed they can be done with normal materials.

SIZE 40 SPORTS
WINGSPAN: 1600mm
LENGTH: 1123mm
WING AREA: $47.08dm^2$
WEIGHT: 2800g
ENGINE: .40/2C .60/4C
RADIO: 4 Channel

EXCLUSIVE TO ALL ABC STORES

★ Refer to Retailers Shop & Service Guide in the back of Airborne for your nearest ABC Hobby Shop.

came on the market I tossed out all the other live hinges. Install these hinges as per directions and I guarantee that you won't remove them without tearing the balsa out. Add a pin to each side as well as the glue and I guarantee that you will break the hinged section before you will remove the hinge. Cut a slot with a thin blade, insert hinge, apply Zap (typical), bend 2 or 3 times and you have a PERMANENT hinged control surface. Excellent!

I obtained all the above items from The Hobby Headquarters, and the following items all came from Kellett's Hobbies.

I have quite a number of beginners visit my workshop and I must admit that I feel a bit tired at times answering the same questions over and over, particularly when it is the one person re-asking the question on several occasions. Okay ... write a book with the answers ... when I get time. Well, a very nice person by the name of Mark Harris has saved me the trouble. His book, **'All About Flying'** tells it all. A top, 46 page book with 58 different topics to answer just about everything a beginner wants to know and an established modeller can use for reference and memory jogging. Every modeller should have this book for his own benefit and to save his sanity when he is sharing the hobby with a beginner. Generally I don't mention exact prices, but this time I make an exception on account of the help this book has been to me when I have a beginner sitting in my workshop. Get yours for a mere $3.50. An investment!

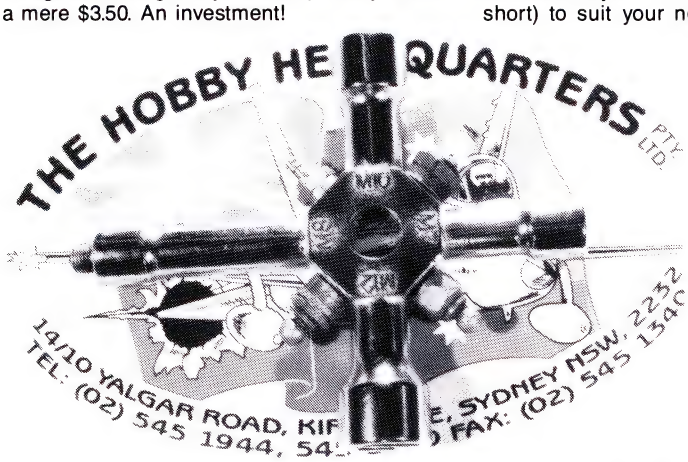
When Mark's book has been totally absorbed you can move on to some expanded information in **'Building and Flying Model Aircraft'** by Robert Schleitcher and James R. Barr of the USA. In the 166 pages of this book you will find information covering rubber power models, control line and radio control scale models, and most things in between. The various chapters cover all aspects of modelling, model construction and flying and a very good coverage on basic aerodynamics. I like this book as it leans towards a complete grounding of modelling for the beginner in so far as it encourages control line and free flight modelling as a good point to start and, if you are satisfied with this aspect of modelling, to stay. It does not project radio control as the be all and end all of modelling. In the last chapter is a full instruction on the compete control line pattern with entry points, angles and exits. Very comprehensive, and recommended for the good information and the view of the total modelling scene.

I have 2 **Edson Engine Mounts,** part numbers M60 FC and M50 LP, and these are the only mounts I will need when I use a four-stroke engine from .20 to .120, a .40 to .80 two-stroke fitted with a pump or the need to include a Perry pump with the engine. These superbly cast mounts are fully adjustable to suit any engine from .15 to .120, depending on the arms (Edson calls them jaws) used. The mounting plate is universal so you can change the arms (long and short) to suit your needs. These mounts are precision items with dead true mounting surfaces and positive locking on the adjustment. The engine mount slots allow fine tuning of the engine position to suit cowls or balance, and changing engines is as simple as loosening two cap head bolts. Arm bolts, nuts, Allen key and full instructions are included. An investment that will last for many models and engines, and spare bits (for crash damage) are available.

While I am on a high, let me wax lyrical about another great find in mounts, the **Sonic Tronics Electric Motor Mount.** This is a fully adjustable radial mount to suit any electric motor without adding weight - well, would you accept 11 grams? Recently I spent hours designing and making a mount to fit a geared electric motor for a glider, and now I find that I could have done a better and simpler job in less than 5 minutes (4 screws, 2 cable ties). Definitely the answer to a vexing problem, and low cost to boot.

My search for the unusual was rewarded by the last item on our goody list. The push rod for the elevator exits your model and you find that the clevis is too low to connect to the control horn! (Gosh, gee and similar epithets.) Weep no more. Fit a **Tettra Angled Clevis** and the job is done. Great for easing control connections in many applications. The angle is 45° and the unit is complete with a 25 cm threaded rod. Lots of uses!

Do you have something worthy of this section? Drop me a line at **33 Hillview Parade, Lurnea, NSW, 2170.**



The cross brace with a few odd plugs from my collection. A plug is retained in the plug socket end by the rubber grip.

SCALE AUSTRALIA

by Ross Woodcock

WORLD WAR ONE WHEELS

I don't wish to seem old, but I well remember modelling, particularly radio modelling, when you couldn't obtain, over the counter, the vast array of accessories that you can today. The clunk tank is a prime example. Some of you will remember going to the supermarket armed with a 6 inch rule to measure plastic bottles, regardless of their contents, that could be used as tanks. In fact, I became quite good at welding plastic with a mini Scope soldering iron so that I could modify and reshape available plastic containers.

So much for yesteryear.

Some time ago I needed a pair of wheels for a ¼ scale WW1 biplane. Today most people immediately think of a popular range of WW1 wheels, but I found that they didn't have quite the right size in their range, and also, they were very heavy, both in weight and cost. I have seen models with trolley and pram wheels, but they also never appear to be the right size, and they always look like trolley or pram wheels.

So, I decided that if some fellows in the dim past made wooden wheels, why couldn't I?

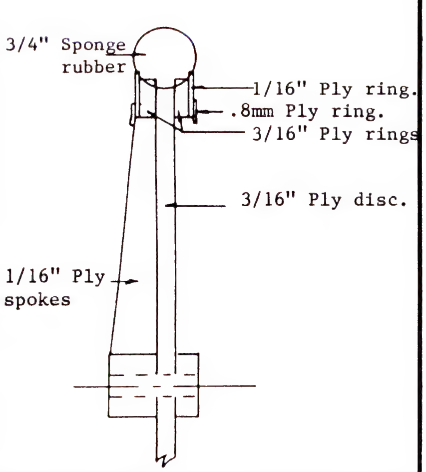
The Method

First you need to draw the cross section of the wheel you require. Next you draw the basic construction (Figure 1). I elected to use $\frac{3}{16}$ inch marine ply for the centre disc (the truth is that it's what I had on hand at the time), and it has proved to be more than adequate on a 20.5 lb model for the last six years and some 300 flights.

The hub is ¾ inch dowel with a ¼ inch hole drilled through the centre. Cut out the centre disc and the $\frac{3}{16}$ inch ply rings. The centre ply disc must be cut and sanded approximately to size. Any minor irregularities will be taken care of when you spin the wheels for shaping.

The $\frac{1}{16}$ inch and 0.8 mm ply rings are cut with a beaut little modellers' aid, made from scrap $\frac{1}{16}$ inch ply. I used this cutting aid originally to cut the masking (shelf paper) for the British style roundels, but it has all kinds of uses and is so simple and low cost that it's not worth making it an engineering exercise in the hope of perfecting or improving its performance (Figure 3). The use of this cutting aid is so simple that I will not explain it further except to say that the knife point is pressed through the ply arm and the point is allowed to protrude only sufficiently to cut whatever material is to be cut, from shelf paper to $\frac{1}{16}$ inch ply. Also, it is rotated by the knife. Take care to cut the inside cut first. If you don't you will have a terrible job stopping the ply from rotating whilst you endeavour to cut the ring.

FIG.1.



Epoxy the rings to the disc and clamp till dry.

Epoxy the ¾ inch dowel to both sides of the disc and hold in place with a ¼ inch bolt and nut to dry. (I use a ¼ inch gutter bolt.) When dry, and using the ¼ inch bolt as a shaft, mount the assembly in a lathe if you have access to one. I turned mine in an electric drill clamped to the bench, or you could use a vertical drill (drill stand). While the wheel is spinning, turn out the rim to suit your drawing. No need for wood lathe or turning tools; a large round file or even a half round file is sufficient.

Next comes the spokes. Your drawing should show how many spokes are required. Cut and epoxy the basically triangular $\frac{1}{16}$ inch ply spokes in place. Once again, accuracy is not paramount and, in fact, it's better to have the spokes slightly higher than required. Remount the wheel in the drill or whatever and, with a sanding block, clean down the spokes level with both the hub and the rim. I didn't put any spokes on the inside of the wheels, as they don't show through the fabric covering, but if you are constructing a wheel where the rim is centered on the hub then you will need to spoke both sides.

The rim is now given a coat of whatever you use to prepare for paint.

If you want to do that little bit extra and include a simulated valve, you will need to cut away a portion of the centre disc and finish the area to accept paint (Figure 2).

Next cut two rings per wheel out of 0.8 mm ply, and cyano them in place as per Figure 1. These are used to attach the fabric to. On later versions I positioned an additional ring of 0.4 mm ply over the fabric to tidy up the edge of the fabric. Also install the 0.8 mm ply surround to the valve access on the spoke side of the wheel.

Cover the front and back of the wheels. I used the same nylon that I covered the wings with. Many wheel covers were painted, some with exotic designs, so you must prepare the fabric just as you would the rest of the model. I was lucky with the Ansaldo as the wheel covers are just clear doped, so a coat of protective clear was all that was required.

The rims are now painted. I used Humbrol Silver. Also paint the area that the valve sits in. The valve is only a small piece of brass tube and an 8 BA brass nut cyanoed in place.

Only in museums are wheels ever clean, s[o] simulated dirt and grease are spread aroun[d] before the protective clear is sprayed on, for th[e] little extra effect.

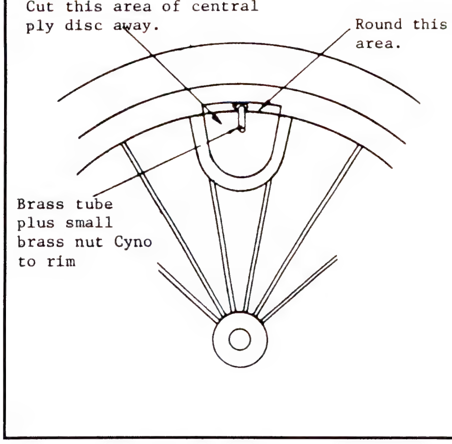
The axle hole is ¼ inch OD brass tube cyano[ed] in place with two ¼ inch steel washers epoxie[d] over the hub.

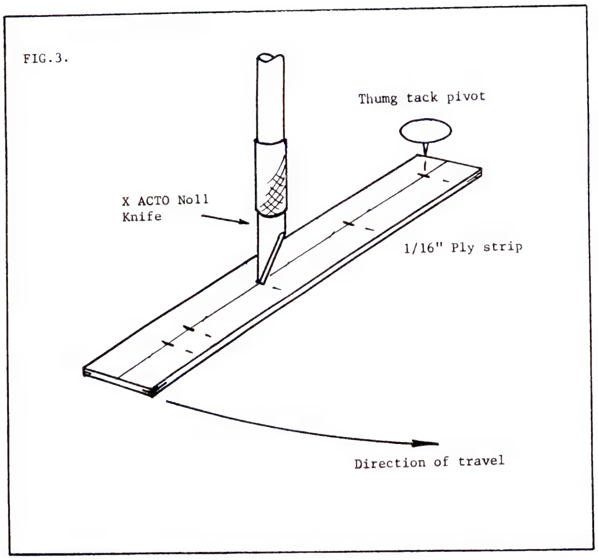
The tyres in this instance were made fro[m] ¾ inch diameter sponge rubber. Measure th[e] circumference of the rim, deduct ½ inch, cut th[e] ends as square as possible and cyano togethe[r]. I can assure you that once the cyano has cure[d] you won't pull it apart. Stretch the tyre over th[e] rim into position. Roll the tyre back from the ri[m] and place some cyano to attach the tyre to th[e] wheel rim. This helps to stop the tyre rolling o[ff] under side loads imposed by those occasion[al] less-than-perfect touchdowns.

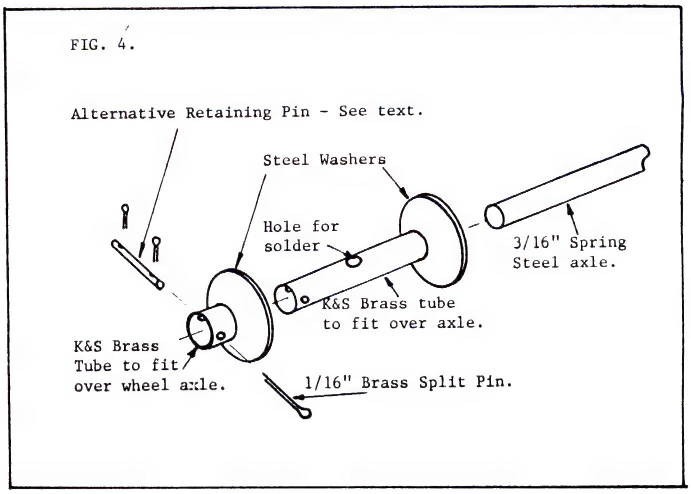
To attach the wheels to the axle I use a slightl[y] different approach from the usual, that's a littl[e] more in keeping with scale. It eliminates whee[l] collars (ugh!) and still allows the wheel to b[e] removed at any time. The majority of WW1 sty[le] aircraft use a cross axle, usually made from tube[.] The wheel was retained in many instances wit[h] a machined hub cap held in place with a spli[t] pin (cotter pin). In some instances the hub ca[p] was retained by a ⅛ inch or $\frac{3}{16}$ inch pin retaine[d] by two small, usually $\frac{1}{16}$ inch, split pins (Figur[e] 4). My method utilises the telescopic abilities o[f] K&S brass tube. The axle is $\frac{3}{16}$ inch spring stee[l] rod held onto the undercarriage with ⅛ inc[h] shock cord (bungee). This axle is cut just shor[t] of protruding through the wheels. The actual axl[e] on which the wheel runs is a brass tube that wil[l] slide onto the $\frac{3}{16}$ inch axle rod. This tube ha[s] a steel washer silver soldered onto one end.

The hub cap is also brass tube of a size to jus[t] slide onto the wheel axle tube, also with a stee[l] washer soldered to one end. No need to silve[r] solder this joint (although it wouldn't hurt).

FIG.2.







Position the hub cap onto the wheel axle sufficiently far apart to allow the wheel to have free rotation, and drill a 1⁄16 inch hole right through for split pin retention (Figure 4).

When this is complete, slide the wheel axle tube onto the cleaned 3⁄16 inch steel axle rod and soft solder in position by heating the axle and adding the solder through the hole in the brass wheel axle (Figure 4). When cool, clean off any excess solder so that the wheel can rotate freely. (Now you can see why the washer on the wheel axle is silver soldered.)

The 1⁄16 inch retaining split pin is somewhat over size in scale, however, you may elect to use a slightly more tedious method such as I used on the ¼ scale Avro and DH50 museum models. Refer to Figure 4 again and you will see the method described. The trick is to drill the 1⁄16 inch brass rod with two No. 72 holes. For split pins I used 5 Amp fuse wire with the head formed around a dressmaker's pin. Using this method of 3⁄16 inch steel rod cross axle and so on, the tube that is inset into the wheels is ¼ inch OD, which allows a ¼ inch bolt to be used as a mandril for turning.

Just a word of warning: don't use excessive heat if using a flame to soft solder the wheel axle onto the steel rod cross axle, as you may soften the axle right at the point of maximum load.

That's it folks. Try it; I guarantee it works, and generates considerable satisfaction.

Write to me at **1 Willowtree Street, Normanhurst, 2076,** and include an SASE if you require a reply.

CHALLENGER
For F3A

by John Edmunds and Graeme Smith

This Aussie design utilises a symmetrical foam core wing, with balsa leading and trailing edges for strength and durability, built-up fuselage and sheet tail surfaces.

CONSTRUCTION

Wing

SETTING UP

Select two pieces of foam 32 x 2 inches. Choose wing root end and measure 11 inches from straight trailing edge and mark. At wing tip end measure 6¼ inches from the straight trailing edge, and mark. Connect the two marks with a straight line and remove the excess foam, which will give you a tapered leading edge. Draw an accurate centre line around the foam wing blank. (Note: accuracy at this stage is critical.) To check the centre line at each end, make up two sighting templates of 16 x 2 inch balsa, fix one to each end of the wing blank on the centre lines and visually sight along the wing ensuring that the two templates are aligned with each other. This will ensure that the wing halves have no twists or warps built in. You are now ready to fix the wing section cutting templates to the wing root ends and wing tip ends.

WING SECTION TEMPLATES

Make up wing section cutting templates from thin aluminium sheet, as this is easy to work with. Copy exactly the wing section templates drawn on the plan as they do not include the $\frac{1}{16}$ inch balsa sheeting covering the wing. Draw a centre line on to the templates and drill two sighting holes as shown on the plan. Attach to the wing root ends and wing tip ends, ensuring that the centre lines accurately align through the two sighting holes. You are now ready to cut the foam wing blanks to the correct wing section.

CUTTING WING SECTION

Pick out your favourite foam cutter and get your wife, girlfriend or flying buddy to help you through this next section. Place the foam wing blanks on a flat table or building board and place some weights on top to ensure that the wing blank doesn't move and stays flat for accurate cutting. Then, with your partner holding the other end of the foam cutter, once it's switched on and hot, commence cutting carefully, following the contours of the wing section templates on each end.

WING SKIN

Select three sheets of 4 x $\frac{1}{16}$ x 36 inch balsa. Using masking tape to hold the sheets in position carefully glue them together side by side. You will need to make four sets of these sheets. When dry, cut each full sheet to match the wing planform, as one will be glued to each side of the foam wing blanks. Using latex contact glue, coat the inside of each set and both sides of each foam wing blank. When dry, carefully and accurately align and attach the balsa to each side of the foam wing blanks. (Note: once attached they cannot be removed; this is a contact cement and will bond instantly, so be accurate first time.) When glued, trim and remove the excess balsa from the sheeting. You are now ready to install the leading and trailing edges.

LEADING & TRAILING EDGES AND AILERONS

Select one piece of ½ x 36 inch hard balsa and cut two leading edge strips 1⅛ inch at the wing root and tapering to $1\frac{1}{16}$ inch at the wing tip. Using PVA glue, attach to the leading edge of the foam wing blanks, using masking tape to locate (no pinning is necessary).

For the trailing edge, select one sheet of ⅜ x 36 inch hard balsa and repeat as for the leading edge with $1\frac{3}{16}$ inch at the wing root tapering to ¾ inch at the wing tip. Put aside to dry. When dry, draw the centre line full length of the trailing edge, and select two pieces of ½ x 1⅜ x 36 inch balsa for the ailerons. Then draw a complete centre line around each aileron blank. Carefully tack glue with balsa cement approx every two inches along the trailing edge. Make sure that this is fully dry before proceeding. You are now ready to shape with a balsa plane and sandpaper to the wing section template profile.

SHAPING

Carefully plane and sand the leading edge, trailing edge and ailerons to the correct wing template section profile, then lightly sand the complete wing assemblies to a smooth finish.

Carefully measure along the ailerons 26 inches from the wing tip then cut completely through the aileron to the trailing edge and, with great care, snap, crack or break off the aileron from the trailing edge. This has now given you a straight and accurate aileron. The centre line will still appear on the inside edge of the aileron for correct tapering and the installation of the hinges.

SERVO BAY INSTALLATION

Carefully mark, hollow out and line with $\frac{3}{16}$ inch balsa all the way to the skin. Then carefully mark out and cut out servo lead tract ½ inch deep x ⅜ inch wide on top of the wing only, making sure that your wing servo plug will fit through the tract (so that it can be pulled through when the tract is covered). Then cover with ⅛ inch strip balsa to ½ inch from wing root so that you have access to your servo lead and plug when the wing is completed. Then sand ⅛ inch balsa to the correct wing profile.

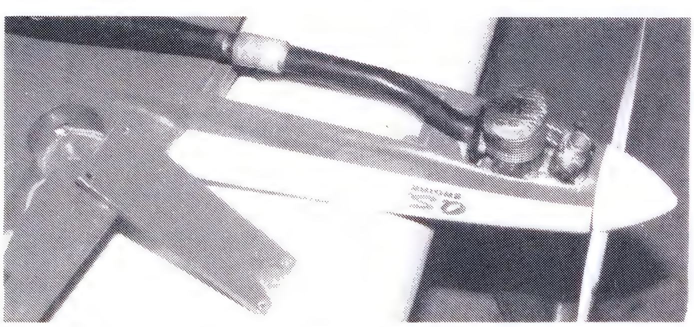
Now decide on your undercarriage installation; retractable or fixed.

FIXED UNDERCARRIAGE

The fixed undercarriage is fitted in the conventional way. Cut out and fit a plywood plate or hardwood block into the bottom section of the wing as marked on the plan to mount the fixed undercarriage. At this stage ensure that the undercarriage leg length is correct. The undercarriage leg length shown allows for clearance for an 11 inch propeller. If using a modern long stroke engine, increase the length by 1 inch for a 12 inch prop.

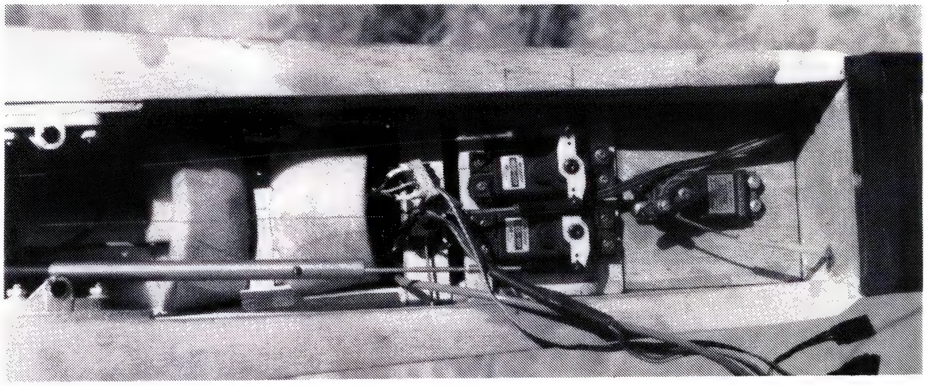
RETRACTABLE UNDERCARRIAGE

Carefully mark out on the bottom of the wing as per the plan. (Note: mounting installation shown to suit Rhom Air retracts.) Cut out ¼ inch ply plate and attach retracts with blind nuts, then remove. At this stage slightly hollow out the foam to take the ply mounting plate. Whilst temporarily

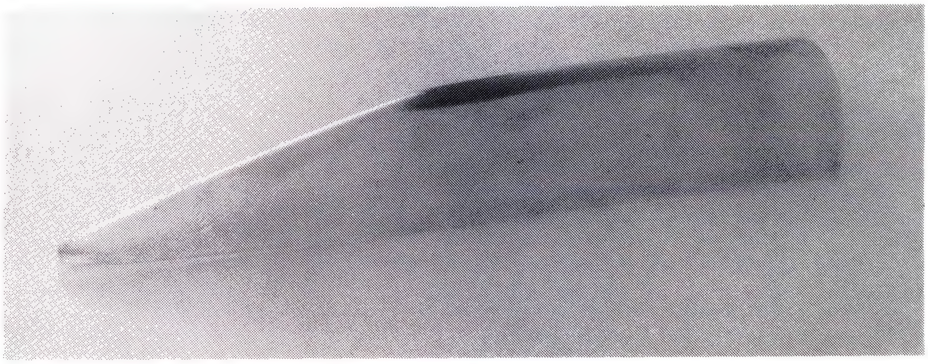


Under side of nose of Challenger. Rear exhaust OS keeps pipe on centreline. Hatch is removed to show fuel tank.

Aileron servo in wing gives short, direct, no-slop aileron drive. Retract main wheel is raked forward for best ground handling.



Radio bay in Challenger. Systems are standard: reliability is well proven. Photos by Graeme Smith.



GRP cockpit canopy cum extended hatch cover for the Challenger. Plan shows balsa version alternative.

bolts that will fit the wing mount bracket bolt holes and sharpen them to a point. Screw these in so that the pointed ends are protruding below the fuselage where the wing is normally located. Now put the wing in place, making sure that the wing is correctly aligned, then push down hard so that the pointed bolts mark the surface of the wing. Drill the wing mounting bolt holes through the centre of the marks left by the bolts, making sure that the angle is correct so that the wing mounting bolts will pass correctly through the wing, aligning with the wing mounts correctly.

Fit the tailpane in its slot, carefully align with the wing and fuselage, then glue into place.

WING FILLETS

Cut out the two 1 mm ply wing fairings as per the plan and, with your wing attached to the fuselage, slide the ply fairings between the wing and fuselage and secure by tightening the wing bolts. Then pin the ply to the wing surface and epoxy in place along the edge of the fuselage only, and leave to dry. When dry, mix some resin and micro balloons into a thick paste so that it doesn't run, and fill the ply wing fairing. When dry, sand to the desired shape.

ENGINE BAY & NOSE SECTION

Cut out a 1 mm plywood ring that will be installed behind the propeller and spinner (as shown on the plan). Install the engine mount to F2 (engine bulkhead) and temporarily fit the engine. Fit ¼ inch balsa nose sides and ⅜ inch triangular strips to the insides, top and bottom. Now glue the ply ring onto the balsa ring, locate it centrally and glue into place. Remove the engine and fill the remaining gaps with ½ inch sheet.

FINAL SHAPING

Carefully plane and sand the entire fuselage to shape, place the cockpit canopy in place and make sure that it fits correctly before gluing into place. Apply a small fillet of micro balloons around the cockpit and canopy joint. Cut out engine bay making sure that there is plenty of space for easy removal and servicing of the engine. (Note: ailerons, elevators and rudder are installed after finishing.)

FINISHING

Apply two coats of K&B epoxy resin to the entire fuselage. When dry, sand smooth and spray paint to a colour scheme of your choice. Cover the wings with Solartex and spray paint. (Note: ensure that your colour scheme gives you good up and down orientation for pattern flying, as you need to be able to see the attitude of the aircraft clearly up to 150 metres away.) After the paint has dried, spray a clear coat of lacquer over the entire aircraft for extra durability and fuel proofing.

RADIO AND TANK INSTALLATION

Now is the time to install the control surfaces. (I use mylar strips for hinges and secure them with Zap.) Glue the servo rails in place as per the plan, and fit the servos in place as usual. Next install a closed loop rudder cable system. Make up a ridged elevator push rod and install. If using retracts, the air tank fits neatly up inside the fibreglass canopy and you will also require an additional servo fitted into the wing with the air valve. Install the fuel tank in the usual way, setting up for either pump or pressure installation. Install your battery and receiver packs in the usual way making sure that they are correctly insulated. (Note: you may need to move your gear around to get the CG right.)

To set up the control surfaces, I suggest the following throws: rudder 1½ inch each way; ailerons ⅜ inch each way; and elevator ½ inch each way.

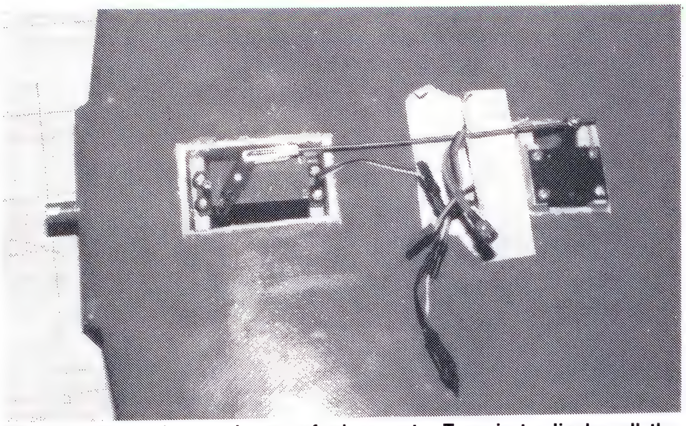
FLYING

With the control surfaces set up as suggested the Challenger shouldn't be too hot or over-responsive.

Using full up elevator, start the take-off run on full throttle. Ease the elevator off as you become airborne. You will discover that the Challenger will leap into the air within 30 feet. This aircraft has no real vices and with a correctly tuned and propped engine will climb vertically out of sight. It performs exceptionally well in all vertical manoeuvres and knife-edge flight.

The controls are light and responsive. Take care when landing to ensure that you reduce the airspeed, as the aircraft has a great glide ratio (due to the light wing loading).

I hope that you enjoy your Challenger as you take up the challenge of pattern flying.



Retract valve and servo in top of wing centre.Tape is to display all the connections. Note single leading edge dowel for wing attachment.

Latest development model of Challenger, a standard F3A competition aircraft. Nicely painted in red, white and blue. Has become Narrabri club specialty with several built and flown by club members.

in place, cut out the wheel well and tract and hollow out to the skin. Now rebolt the retract unit onto the ply mounting plate and carefully clean out the foam until the wheel and retract are at the desired depth. (Note: the front of the ply plate is mounted deeper than the back; this allows for forward angle of the undercarriage leg.) Great care must be taken at this stage. When happy with the fitting, epoxy the ply undercarriage mounting plate into place. Epoxy a balsa block to the top of the ply and sand to the correct wing profile.

JOINING WING HALVES

(Note: ensure that you have a **flat** table.) Make two templates 10 x 2 inches and attach on the centreline of each wig tip. Place both wing panels, top up, on the bench, then place a $1\frac{1}{4}$ inch dihedral block under one wing tip. Sight along the whole wing and when the templates are in line glue the wing roots together with epoxy. When dry, fibreglass the wing centre area as marked on the plans. Then get your wing tip blocks and accurately mark a centre line completely around. Now glue to the centre line on each wing tip. When dry, hold each aileron in place and mark each side to the centre line on the inside of each wing tip block.

Now you are ready to clean up and sand the whole wing. If you are going to use retracts, cut out an extra hole in the top of the wing for your retract servo using the method described previously for the aileron servo installations. You will see my method in the photograph. I have used a B'N'D retract valve. These are excellent because they use an arm to operate the air valve, which is better than the push-pull method.

Tailplane

The tailplane is built up using the same method as for the wing. (Note: when joining the tailplane halves, make sure that there is no dihedral.)

Fuselage

SETTING UP

Select some nice $\frac{1}{4}$ inch square straight grained balsa. Depending on the length of the balsa, you may have to join another piece on the tailplane end to make up the correct fuselage length. Carefully mark and cut out the fuselage sides. On the outside of each fuselage side, draw a thrust line the full length of the fuselage, then mark out accurately the positions of the bulkheads F2, F3 and F4. Between F3 and F4 draw the wing section root template centreline which will be situated **below** the thrust line, $1\frac{3}{8}$ inches at the leading edge and $1\frac{1}{2}$ inches at the trailing edge. Now draw the tailplane section root template centreline **above** the thrust line, $\frac{1}{2}$ inch at the leading edge and $\frac{7}{16}$ inch. Draw these lines in red biro so that they stand out; they are important reference points, so do not rub them off.

BULKHEADS

Cut out F2, F3 and F4 using good quality plywood. Use at least $\frac{3}{8}$ inch ply for F2, as this is the engine bulkhead and anything less than $\frac{3}{8}$ inch would probably give way. Use $\frac{1}{4}$ inch ply for F3 and $\frac{3}{16}$ inch ply for F4. Draw accurate centre lines on each bulkhead as shown on the plan.

PLYWOOD DOUBLERS

Cut out two 1 mm doublers and carefully glue one to the inside of each fuselage side using contact cement.

TRANGULAR SECTION

Cut out four lengths of $\frac{3}{8}$ inch triangular section balsa and glue onto the top and bottom inside of each fuselage side, using a strong glue (white glue or contact cement).

FUSELAGE ASSEMBLY

Now draw a nice long centreline on your **flat** building board and, with all your favourite weights and clamps, pre-assemble the fuselage sides and bulkheads, checking that everything is properly aligned. Chamfer the last 6 inches of triangular section so that the tail ends of each fuselage side come together cleanly to equal the width of the rudder. If everything is to your satisfaction, disassemble the parts, then reassemble them and epoxy them together, making sure that F2 (engine bulkhead) has the desired side and down thrust. Make sure that everything is aligned correctly again before the epoxy sets.

TANK BAY

Cut out and glue a $\frac{3}{8}$ inch triangular section to the inside top of each fuselage side. Cut out $\frac{1}{4}$ x $\frac{1}{2}$ inch balsa strips and glue to the bottom of each side. Next cut out two hardwood rails to screw the tank hatch to. These go across the fuselage at F2 and F3. Next cut out a $\frac{1}{4}$ inch thick tank hatch cover. I used $\frac{1}{4}$ inch ply as I needed some extra weight in the nose, however, balsa is fine.

CENTRE SECTION

Glue $\frac{1}{4}$ x $\frac{1}{2}$ inch sheet balsa to the inside top of the fuselage (which will be directly under the canopy). Next glue $\frac{1}{2}$ inch sheet balsa from F4 to F2 on the top of the fuselage. Owing to the curvature you will need to fit it in two pieces (as per the plan). Cut out F5 and F6 using $\frac{3}{16}$ inch balsa and glue to the top of the fuselage. Glue $\frac{1}{2}$ inch sheet on top. Fit $\frac{1}{4}$ inch balsa fillets to each side of the fuselage top. Now fit the $\frac{3}{16}$ inch bottom sheet. When this is completely dry, tidy up and round slightly to the basic fuselage shape with your razor plane.

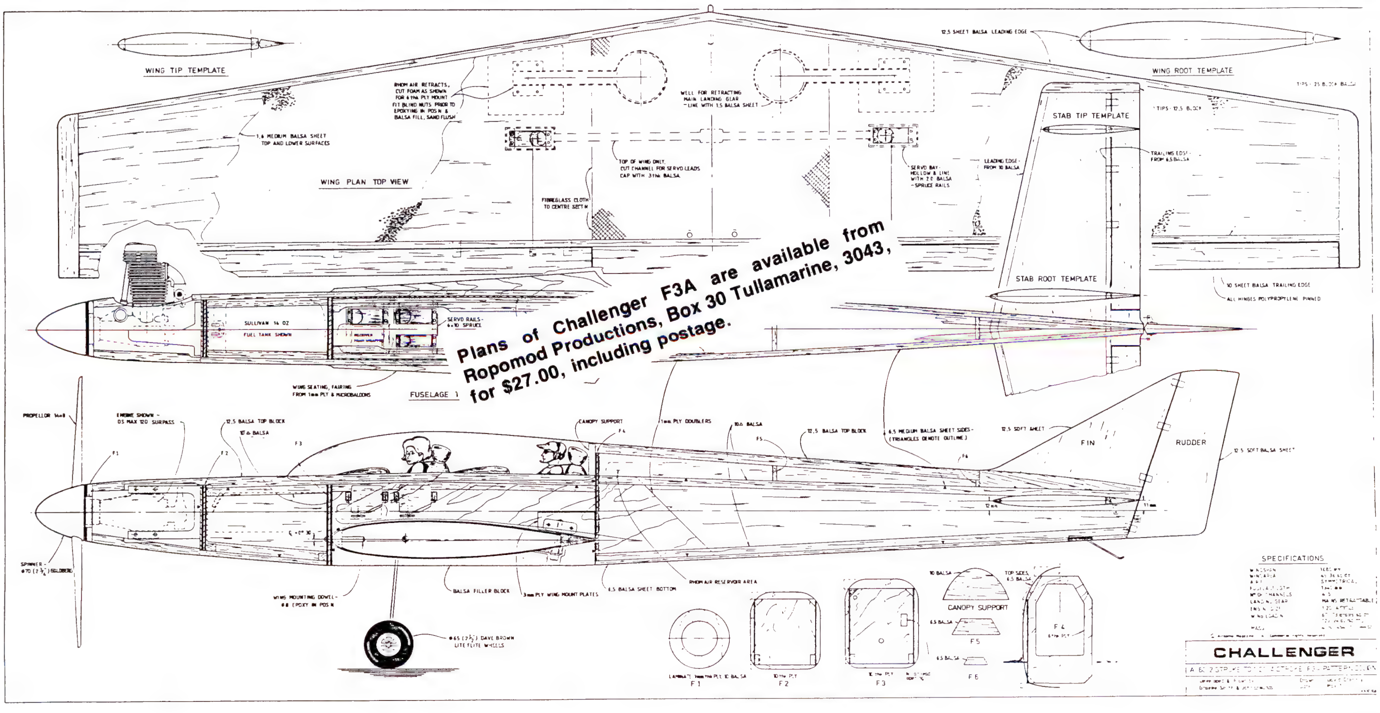
In front of F4, cut out the canopy support, then place the canopy on top. Draw a line around the canopy on $\frac{1}{2}$ inch sheet balsa, then cut out the section and remove, as this area will become your Rx and air tank bay. Do not glue into place at this stage.

FIN AND RUDDER ASSEMBLY

Cut out the fin and rudder from $\frac{1}{2}$ inch soft sheet balsa. Glue the fin into place making sure that it is absolutely vertical (90 degrees) to your flat building board. Cut out and glue the balsa fillets to each side of the base of the fin. Carefully cut out the tailplane slot to the correct section, ensuring that the incidence is set as per the plan.

Fitting Tailplane and Wing

Make two $\frac{1}{8}$ inch ply mounting plates and attach the wing mounting brackets and glue in place on the inside fuselage sides as shown on the plan. Install the wing mounting dowel into the centre of the leading edge of the wing, but do not glue until correctly aligned. Find two steel



Introduction to Aerobatics

PART II

by Jason Milner

TURNAROUND FOR IMMELMANN

Among the letters sent in response to the article in No. 110 was the surprising revelation that Max Immelmann did not do an Immelmann Turn, the half loop with the half roll off the top. The reason was that his aircraft were not capable of flying it! This was in a letter from Noel Shennan of Campbelltown in NSW, and Noel put it in these words ......

The Immelmann Turn - A Second Look

The present generation of aeromodellers has absorbed aeronautical history, as published, in huge quantities, and amid all the facts, a few misconceptions have been passed into the language.

Take the turn used, but certainly not originated, by Max Immelmann in WW1. Open any dictionary of any coverage, even the huge Websters, and you will find this manoeuvre is described as a half loop followed by a half roll, giving a 180° change of direction for a get-away (and presumably to get into position for a further stern attack).

In his book 'Flight Path', Frank Courtney refutes the Webster definition, and I quote, "the turn that Immelmann actually used (and I saw him use it often enough) was simply a very steeply banked climbing turn, requiring much skill in those days when stalling was greatly feared. It was an impressive feature of stunt flying before the war; the French called it a Chandelle, and the Americans later adopted that name. Immelmann, however, was certainly not the first to make combat use of it.

Immelmann never made such a turn (Webster's), never could have made it, and would never have used it in combat even if he could ... not anywhere near enough lateral control to half-roll the plane as it slowed to near-stalling speed at the top of a loop, and it would be a long time after Immelmann's death before a plane existed with enough speed and control for that manoeuvre. In any case, Immelmann was too clever a fighter to use a stunt that would leave him suspended upside-down, with almost inert controls, for enough seconds to make him a limp target for an enemy gunner!"

So, let's call the half loop and half roll just that, and the Max Immelmann manoeuvre a Chandelle or Immelmann, as it really was. This misconception has lasted for too many years, and seems to have gone unquestioned until now.

THE POWER PLANT

While you are learning aerobatics, one thing that will raise your general level of confidence no end is the knowledge that you have a reliable engine. Let's face it, you're not going to be trying any hot-dogging while your model's only power source sounds like it's about to have a cardiac arrest. So, before we continue with manoeuvres, here are a few tips on the care and feeding of the modern model engine, that will help prolong its working life

Tip No. 1 - Before you apply full throttle, let the engine run at idle for a few seconds after start up. This lets the engine parts warm up to the best fits for running, and may reduce wear. Also, starting at full throttle is more dangerous.

Tip No. 2 - Always run the last of the fuel out of the engine when you have finished flying for the day. Do this by disconnecting the fuel and pressure lines from the engine and then start the engine and let it run until it stops. You may be surprised at how long it runs.

Tip No. 3 - After you have run the last of the fuel out of the engine, give it a dose of After Run Oil to protect it from moisture build-up and corrosion. This stuff doesn't necessarily have to be anything special; one modeller I know uses straight sewing machine oil, while I have seen others use WD40 or RP7 spray lubricant. Still another cleans his engines out by flushing them with a mixture of 50% petrol and 50% transmission fluid to remove any nitro residue. (By the look of his engines, it seems to be working.) Some pilots don't do any of this and have no problems.

Tip No. 4 - Always empty the fuel tank after a day's flying, otherwise the methanol in the fuel will evaporate leaving an oily sludge. Methanol also absorbs water which will contaminate the fuel. The net result of all this is to make starting and tuning your engine difficult next time you first run it. Another reason for emptying the tank is that the above concoction can leak through to the engine causing corrosion and ruining your motor.

Tip No. 5 - Always use a good quality glo plug. Admittedly they can be expensive, but they really are insurance for your model (so don't skimp!). Also, if your engine is giving you trouble the glo plug is usually the first thing to check.

Tip No. 6 - When tuning your engine, don't lean out the needle valve all the way. Once you have achieved top rpm, back it off a few clicks (say an eighth to a quarter of a turn). This will prevent the engine from running lean and over-heating as the fuel level falls, which can badly damage an engine and significantly reduce its working life.

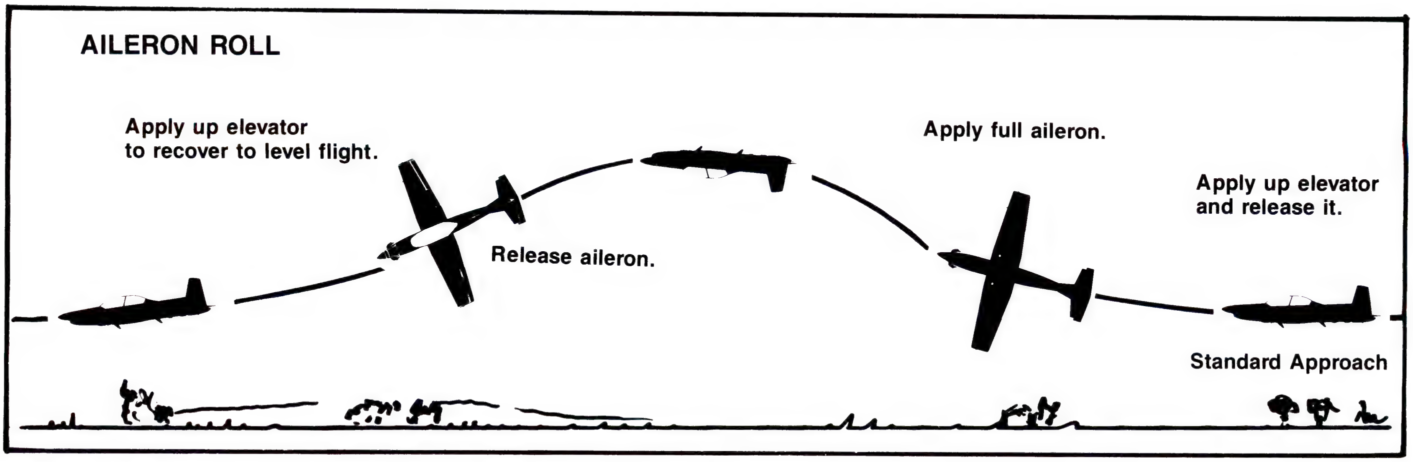
Tip No. 7 - Once you have achieved a reliable setting, the needle valve should not need to be touched, apart from small adjustments to compensate for greatly different weather conditions. If you find that large changes are required, then it may be time to get it looked at by your club's resident engine expert.

Tip No. 8 - See the Engin-ear's column for advice about fuels.

Tip No. 9 - It is fair enough to assume that the power plant will continue to behave when it is running properly. When it starts to misbehave,

Trevor Pye, a junior of Numurkah, Vic., with his AIRBORNE P- (P for Practice) Ship. This design has rudder, elevator and throttle controls. Wing loading is moderate and loops and turns are tight.

This Hustler with OS 40 FP is by Hamish White. This famous Aeroflyte design is regarded as an aerobatic trainer. It has ailerons as well as R, E and T, and should do reasonable axial rolls. Wing loading is usually high making the model fast in the air, using lots of space for manoeuvres, but they can be performed smoothly.



check all the parts of the system till it behaves properly again, starting with the fuel supply, glo plug, mount and so on.

MORE AERIALS

The next manoeuvre we are going to look at is the Roll. To do a basic roll you really need a model with ailerons. As I write this I can hear the cries of "But I've got a rudder-only model that rolls OK!". Maybe, but in my opinion these aircraft are in the minority, so I still recommend either fitting ailerons to your model (you can build a new wing that incorporates them, or modify the existing wing), or treating yourself to a new model. For those of you with rudder-elevator only models, I will be explaining how to perform a variation of the basic roll called a barrel roll.

Before attempting any type of roll, you should get to know the roll rate of your model. A good way to judge it is to observe the amount of roll control you are using to do a normal turn. If you find yourself using more than about 60 to 70% of the total available stick travel then you may not have enough to comfortably execute a good roll. Another way of testing the roll rate of your model is to perform a manoeuvre called a Split-S, which we will look at later. If you are really feeling nervous, try asking a more experienced pilot to test the model for you.

If you feel that the roll rate of your model is inadequate, then you may want to increase the control throw on the ailerons. To do this, move the push rod connectors out by one hole at the servo end or move the push rods closer to the wing surface where they are attached to the aileron torque rods. When making these kinds of adjustments to your model, don't make the change too excessive or you could end up with an unflyable model and an expensive repair bill.

If your radio has them, dual rates provide an excellent way to experiment with the control throw settings on your model, since they allow you to switch back to a more familiar rate if the new one starts to get a little hairy. Many designs roll slowly with a little aileron input, and pick up the roll rate with greater stick movement.

The Basic Aileron Roll

To start with, line up on standard approach, with full power, flying into the wind, just as you did for the loop. Then, just before the model reaches you, feed in a little up elevator to put the model into a climb of about fifteen degrees or more, then centre the elevator control. Next apply full aileron to roll the model over. Whatever you do, DON'T LET GO until the model is upright again. When the model has completed the roll it will almost certainly be in a slightly nose down attitude, so apply some up elevator to bring it back to level flight.

All the control inputs in the above sequence are done one at a time, and each one is centred before applying the next one.

The Barrel Roll

For this version of the roll, line up on a standard approach with full power, going into the wind. Just before the model reaches you apply up elevator and left or right rudder together, smoothly. The model will then do a kind of cork-screwing sideways loop. As the model returns to level flight, smoothly release both the elevator and the rudder.

For your first attempts at this manoeuvre you will probably want to use full elevator and full rudder to get the manoeuvre over and done with as soon as possible. While this is fine for most aircraft, it can place your model under a lot of stress from high G loads. So, if you are at all worried about your wings coming apart in flight, then the trick is to vary the amount of rudder and elevator throughout the manoeuvre, using only as much as necessary. Doing the manoeuvre this way also makes it look prettier.

If you want to use ailerons to do a barrel roll, then don't use any rudder and use the aileron only sparingly or you could end up doing a Snap Roll, and while this sort of roll can be fun to do, it is a very violent manoeuvre and will probably cause you to panic if it happens unexpectedly. It will, however, be discussed in a future article.

The Split Ess

When doing rolls it is nice to have an escape plan just in case something goes wrong (like dumb thumb or brain freeze). The Split-S from level flight is perfect for this.

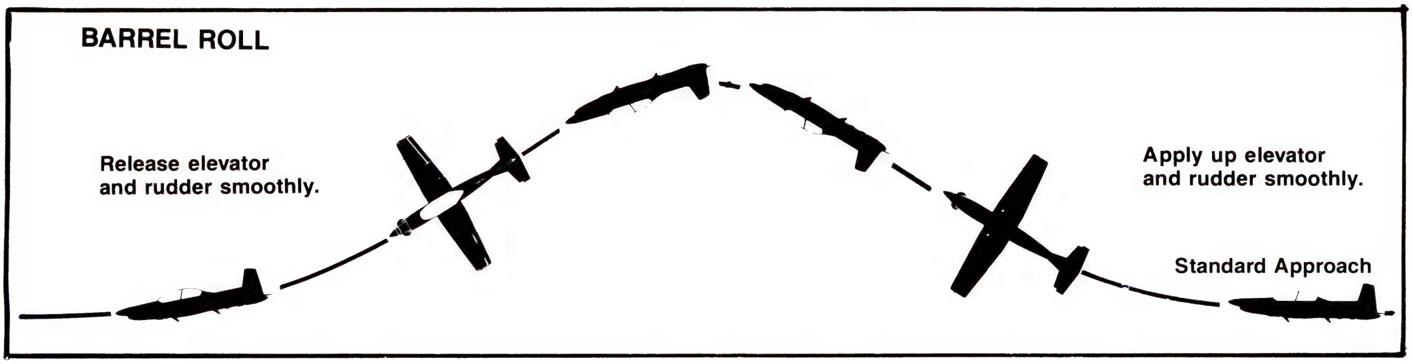
Before we try the level flight variety of the Split-S, we will look at how to perform the more common version. Start with the normal standard approach going into wind. Then, as the model reaches you, pull up into a climb of about 45 degrees or so. When the model reaches a comfortable altitude, roll it over. When the model is inverted, smoothly feed in up elevator and reduce the throttle just as you would do at the top of the loop, centering the elevator when the model returns to level flight.

For your initial attempts, the climb angle and the positioning of the roll are by no means critical and are mainly dictated by personal preference and the capabilities of your model. If you want to do a pattern style Split-S, though (known in competition as 'Half a Reverse Cuban 8'), the climb out angle must be 45 degrees and the roll to inverted must be placed half way between the pull-up and the point where the loop-out begins. You will also lose points if your model exits the manoeuvre higher or lower than it entered, or if it changes heading (drifts off to the left or right) during the manoeuvre.

If you want to do a Split-S from level flight, simply start your approach from higher up (about where the top of a regular Split-S would be) and leave out the 45 degree angle climb.

CHECK IT, CHECK IT, AND CHECK IT AGAIN

Before I leave you for this issue, I would like



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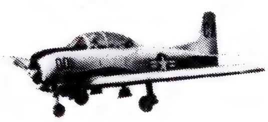

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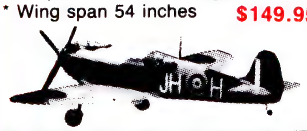

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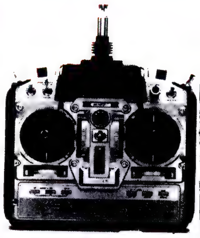

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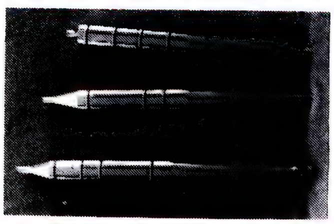

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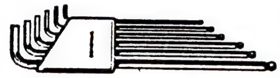

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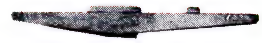

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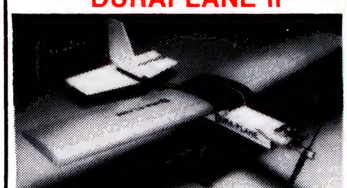

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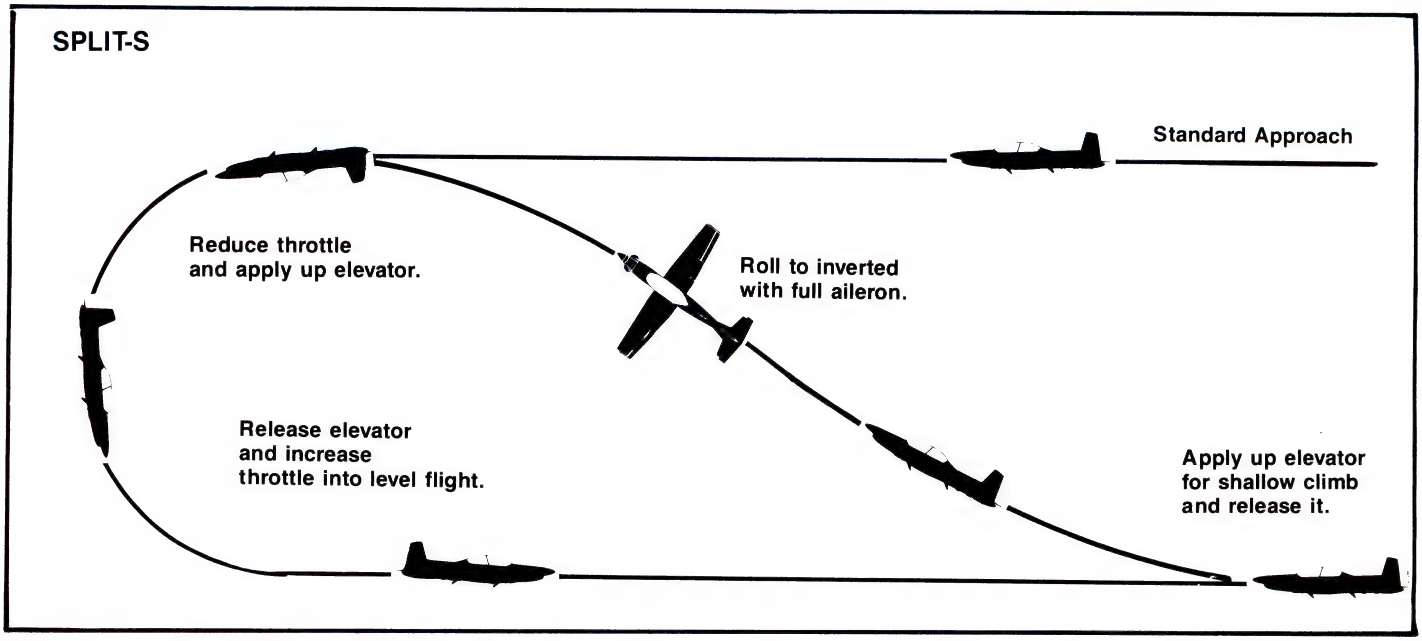


to share with you a "Do as I say, not as I do" story. On a recent flying trip with my old faithful sports model, a sequence of events unfolded that went something like this. Put model together, fuel up, do a range check, start the engine and taxi out, line up on runway, apply full power. The model takes off and promptly rolls over and re-acquaints itself with mother earth. I figured out the cause of this accident even before the aircraft had hit the ground. I had simply neglected to check that the ailerons were operating in the right direction.

To prevent this phenomenon from inflicting itself on you, make sure you do a complete control check before every flight to make sure that all control surfaces are working and that they are going in the right direction. The best time to make these checks is before you start the engine.

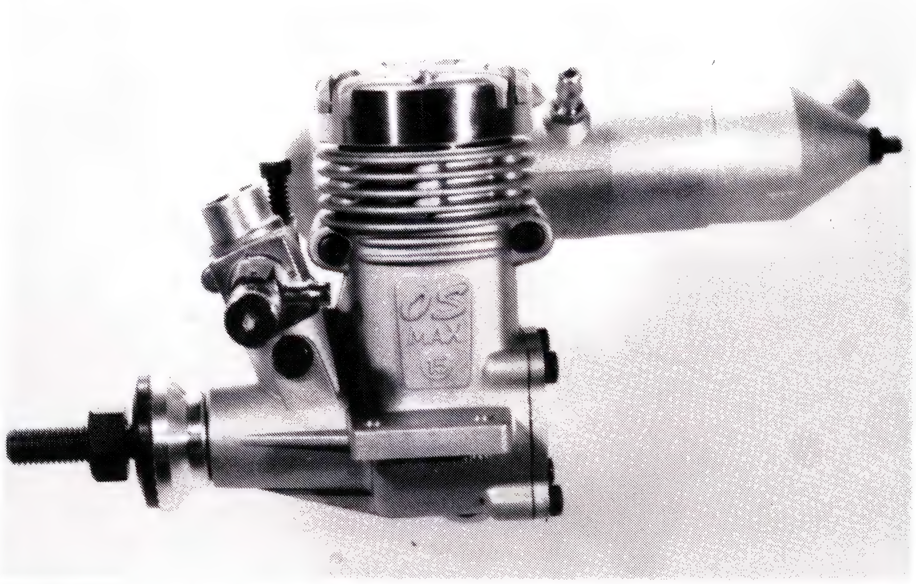
The above article is dedicated to my friend and mentor, G.D., whose help, advice and prodding have been invaluable. I have to keep practising my aerobatics just as you do.

Engine Review

O.S. 15 FP

SPECIFICATIONS

Displacement:	2.49 cc (0.1517 cu in)
Bore:	15.2 mm (0.5984 inch)
Stroke:	13.7 mm (0.5393 inch)
Weight complete:	178 gm (6.31 ounce)
Power stated:	0.31 BHP @ 17,000 rpm
RPM range:	2,500 to 18,000
Prop shaft thread:	U.N.E.F 7/32 x 32 TPI
Plug:	Medium range RC
Prop range:	7 x 5 to 8 x 5
Lubrication:	20 to 25% castor oil



The OS 15 FP. A long way from the first OS 15 that won the Free Flight World Champs in the early '60s.

THE ENGINE

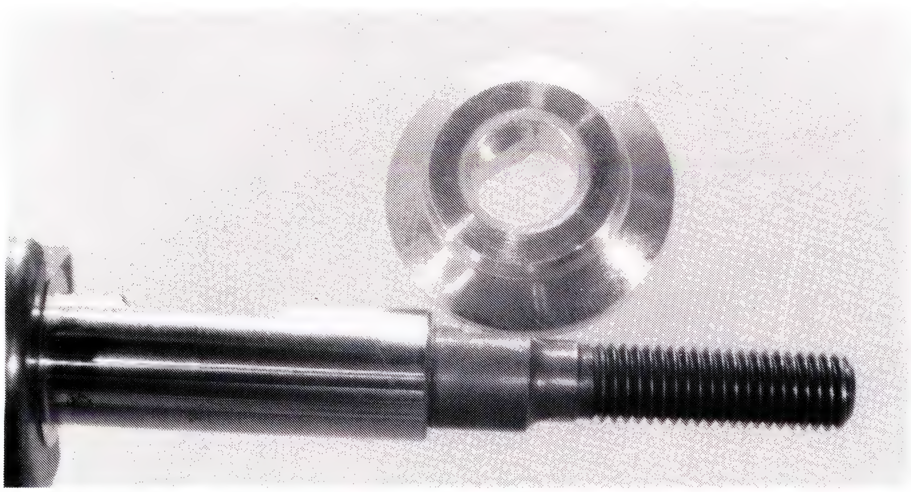
The range of engine sizes commonly used these days puts this engine in the small category, suitable for beginners and powered gliders. This outlook is from modellers new to the game with a background of "start with a good .40 engine" advice on their first visit to a flying field. I feel sorry for all those modellers who have missed the enjoyment of a reliable 'little' two-stroke engine and the pure fun available. On the other hand, modellers who have been around for a decade or three (or more) will remember that an engine of this size would have been considered a mid range power source, as the most common large size was 5 cc.

I would like to be able to transport back in time with this engine as I know I would be the star turn at any flying field and subject to many offers to purchase or swap. The performance of the engine would not be the only desirable feature, as the general design and manufacture would certainly gain the interest of any engine-loving modeller.

I'm not claiming 'the good old days', as the days were not always so good, with some of the engines available at the time. Starting was a hobby in itself, and could use up a sizeable chunk of the day. An engine could be a beast to start when cold and bl..dy near impossible when hot. I remember the common practice of pouring fuel over a hot engine to cool it for starting, and I also well remember the problem of trying to purchase a replacement head for the one that warped for some reason after the fuel-cool treatment. Engines had two speeds in those days - stopped and flat out - and the rare experiments with questionable throttles were just about a waste of time as there was no radio to control them and a third line on a yo-yo was about as popular as a hip pocket in a singlet.

What a change in the scenario! Here we have a superbly made little engine that is reliable, equipped with a throttle and muffler, designed to last for ages of reliable use and, if you can't start it within 4 flicks straight out of the box or when hot, then your ancilliary equipment - plug power, fuel or flicking finger - is faulty. By the way; in the unlikely event of having to replace a warped head or any other part due to user damage or having a problem due to manufacture, the engine is guaranteed and parts are readily available.

Hopefully I have convinced some of you hardened modellers that a small size engine is worth a try for the fun, fuel economy, quietness and low model cost, and given beginners some alternative information, so ... let us delve into the internals of this pleasant little beasty.


Attention to finish and design detail. The radius on the crank web cum counterweight can just be seen at left. Shaft has flat to engage prop driver. Very positive system

CASTINGS

There are many factors to consider in casting parts for model engines. The stresses are tremendous due to the operating factors, torsional and gyroscopic forces, but strength cannot be gained by using substantial metal sections. Power to weight figures demand aluminium alloys, and even these have to be as light as is possible. Only by a lot of consideration of design can workable sections and weights be obtained. The other factor to consider is that the metal itself has to be of superior quality in many aspects. A certain toughness and hardness is required, yet the alloy has to be amenable to fine machining, flow into every detail in the molding process and not warp under operating loads. One of the alloying ingredients is silicon, a metaloid element found principally in sand, also used in the production of glass. This imparts a hardness (amongst other properties) and pourability to aluminium alloy, but the amounts are very critical. Very high silicon alloys (20% plus) are brutes to machine and a fine surface is not the easiest to obtain. To see an example of getting it right, have a close look at the OS casting work. Not a sign of slump on sharp edges, no pinholes, no variation of colour, ultra light yet extremely strong and machined surfaces would lead you to believe that the job was machined from pure aluminium bar stock with its chrome-like finish.

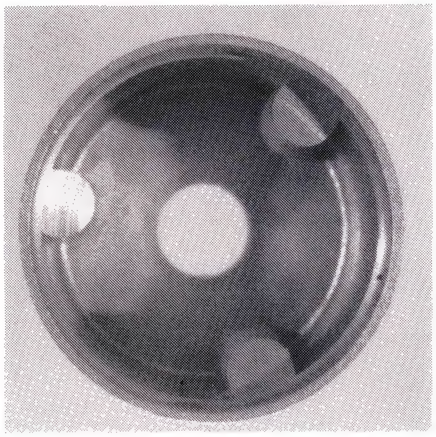
The main bearing is a cast in bronze sleeve and a tiny roll pin is inserted into the top of the barrel for correct location of the liner. All threads are clean and sharp, and the silver satin finish gives a pleasing appearance. The head is also a casting with deep finning and an 11 mm diameter combustion bowl. This is one of the factors of easy starting and overall performance.

The muffler is a three piece casting fitted with a pressure nipple and a variable direction outlet pipe. The third or centre section is a mute or noise reduction unit. An interesting design with a lot of thought. Most muffler mutes are simply volume reducers and miss out on the silencing factors available to this addition. In this unit you will see three rods cast against the inside wall of the mute and arranged at 120° spacing. They serve a twofold purpose. The exhaust gas comes out as a forceful blast - fast and hot. It is the fast and hot that accounts for most of the sound volume. It stands to reason that slowing and cooling these gases is going to reduce the volume and this is the reason for the rods. As the blast of gas hits the wall of the mute and swirls in its effort to get through the hole, it is broken up by the uneven surfaces created by the rods (sort of break the ranks and destroy the enemy) and this knocks off a few dBs. The mass of the rods absorbs and dissipates a considerable amount of the heat and this rips off a few more drops of sound. The hole in the mute slows down the blast and also takes its toll on the sound volume until we have almost a whisper out of the rear pipe. Okay ... it's not exactly whisper quiet, but it is way down the scale. Inside my engine testing, metal clad workshop on a steel test bench with the engine area enclosed with hard surface walls (what I'm telling you is that the situation is not the best environment for quiet operation), I recorded, using a Taipan 8 x 4 prop, 13,100 rpm at 93 dB with the standard muffler (no baffle). With the mute installed and all other factors the same, I recorded 12,600 rpm for a reading of 89 dB. Without going into the mathematics of it, a drop of 4 dB is very substantial as the numbers are a multiplying factor. The drop of 500 rpm is quite acceptable, and I would give this drop any time for a 4 dB reduction in sound. It is quite obvious that the dB reading will be much lower when recorded in the open on a flying field and at the stipulated distance. (My readings were taken 1 metre from the engine at 90° to the crankcase axis.)

THE WORKING BITS

As I was photographing the engine parts, a friend visited and I showed him the piston and liner as an example of quality work. He gave the parts a good eyeball then, in sudden shock announced, "You've been dudded! There is a boost port in the rear of the liner but no port passageway in the barrel. When the liner is installed the boost port is blocked off." In mock shock I replied, "Not only that, the lousy coots are saving on aluminium - look at the hole they drilled into the piston!" I let him carry on a bit muttering that he never considered that OS would stoop so low, and then I let him down gently from his soapbox.

Cunning readers will have judged a relationship between the hole in the piston and the boost port and why there is no port passage. In operating assembly, the hole in the piston lines up with the port. As the piston descends, pressure builds up in the crankcase and forces fuel gas up the side port (Schnuerle) passages and into the interior of the piston. As the piston continues down, the hole lines up with the rear cut-out in the liner and fills it with fuel gas. As it reaches the bottom of the stroke this reservoir of gas is pressurised until the crown of the piston clears the top of the port by just a smidgeon (little bit).



Mute section in the OS 15 muffler. Dual action helps to achieve its purpose.

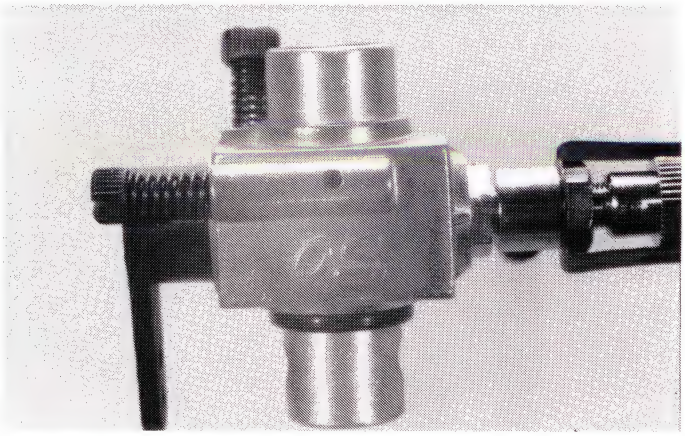
This is akin to kinking the garden hose until your sister walks past and then releasing the pressure - a great blast of water shoots out and knocks the braces off her teeth or overalls, as the case may be. In the engine the blast of stored fuel gas jets up in a superfine mist to the combustion area to meet the gas from the side ports and they all have a dance around the communal camp fire (for about 1/13,000 of a minute). This is one form of piston porting and is a performance design feature which, like the combustion bowl, is a factor of the overall performance with accent on the higher rpm range.

The first series of FP range of engines had steel-iron liner and piston combinations, and the performance was very pleasing. The series has the now very popular ABC configuration. This type of specification is **A**luminium piston, **B**rass liner, **C**hrome plating on the liner, and is now accepted as a performance design with long life and no problems.

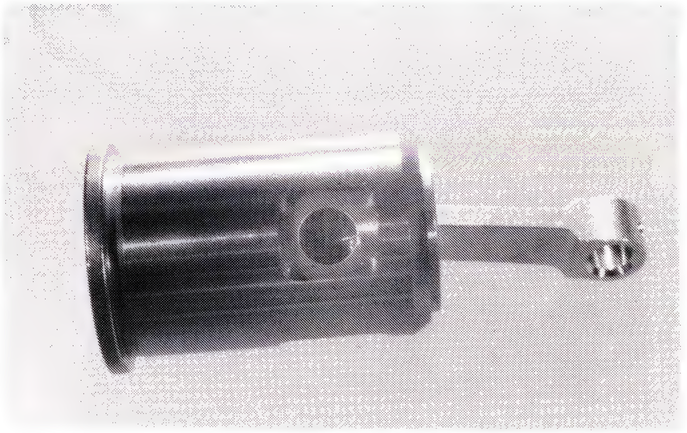
Forget the con rod - it is the usual no break, no wear OS special. These rods can take tremendous abuse and still come out shining and seemingly last forever. The crankshaft is also a forget area due to the sturdy construction and super fine machined surfaces. The front edge of the counter-weight has a large radius which is uncommon but a good design factor as it assists in providing adequate lubrication to the plain bearing. One point here ... don't lose the prop nut as you will only get spares from the local hobby shop (the Enya .15 is the same size) as this is a rare thread and not to be found in the local hardware shop. Its use is for mechanical design. A ¼ inch shaft would be too big, $^3/_{16}$ inch too small and 5 mm thread too fine with insufficient depth to suit OS standards. The $^7/_{32}$ inch with 32 TPI gives good shaft strength, adequate thread depth and enough pitch to make the threads robust for the type of use (or misuse) it would be subjected to as a locking shaft. The propeller drive disc is a D fitting; that is, the hole in the disc and the shaft section on which it fits is the shape of a capital D. A shim steel washer fits between the drive disc and the front of the shaft housing and is necessary, so don't lose it.

THE 'JUICE-IN' BIT

The carburettor is an OS No. 15 air bleed unit with throttle stop and replaceable needle assembly (in case of "Blast!" landings). These are simple carbies that work extremely well and I would be very surprised if they are ever superceded. No matter what is said about the outmoded design, they are an exercise in simplicity that is most efficient. There are no super sensitive adjustments, O rings to wear and leak, hard-to-get-at adjustable needles or enveloping tubes that must never be damaged in any way as is found on some of the modern type carbies. These carbies work, and work well, even in the mid range, and can go for hundreds of hours without wear problems or need of adjustment. Only one point to remember: to choke the engine the throttle must be wide open otherwise the carby sucks air in through the bleed hole and



The OS airbleed throttle. Small hole in raised section in front is the air intake for low speed running. Screw with spring at left is for controlling the air flow through the hole. Same type of screw behind is throttle barrel retaining and stop screw.



Circular hole in piston allows gas flow through port in the liner and into cylinder around BDC. Piston port timing has been developed for top motorbike engines.

you don't get a good charge of fuel.

The principle of operation is so simple - normal needle for high speed mixture, slotted screw and spring across the front for low speed mixture and slotted screw and spring in the top for idle speed adjustment and throttle rotor retention. Right then ... we wind the main needle out about 3 turns and start the engine. When it warms a little, wind the needle in about 3 clicks and wait for the engine note to change and stabilise. Continue this process until the engine is at peak rpm, then wind the needle back about 4 to 6 clicks to give a slightly rich setting. Now close the throttle and set the top adjustment screw to give the lowest rpm without the engine stopping. Holding the model in a level position, tilt the nose up about 15°. If the rpm increases, the engine is too rich, so open the air bleed screw across the front of the carby body about half a turn. Repeat this until the engine will run evenly in the level and tilted positions. If the engine runs roughly or slows to a stop when the nose is tilted up, the idle setting is too lean, so close the screw (wind it in) half a turn and repeat this as necessary to obtain even running. While you stay with the same prop and fuel there is no need for further adjustment unless you have weather that changes from Sahara desert hot to Arctic cold each season. Under normal circumstances the carby is insensitive to moderate weather changes so ... **don't fiddle!**

To finish the education of beginners to engine tuning, the principle of operation of this carby is common to most carbies at mid to high rpm in that the air is sucked down the throat (venturi) and, as it passes the jet tube it sucks an amount of fuel that has been metered by the needle valve to give a proportion of 4.5 parts of air to 1 part of methanol. Too much air (not enough fuel) and the mixture is lean and, conversely, too little air (too much fuel) and the mixture is rich. Although we always talk of the amount of air going into the carburettor, it is the amount of fuel that is referred to when we consider rich or lean running. You set this fuel supply by turning the main needle: in to lean the engine - out to richen it. The air bleed setting is for the idle mixture and it is simply a hole in the carby body that leads to the venturi and the hole has a small bolt (screw) adjacent to it that, when screwed in, reduces the area of the hole. As the rotor closes the venturi, the air for the carby comes through the air bleed hole. Again, we consider the lean or rich mixture. The setting for this screw is as described in the nose-up test. The screw on top of the carby is simply a mechanical stop for the rotor. Screw in and the idle SPEED increases - screw out and the SPEED decreases or, as some modellers prefer, the engine stops and they use the trim adjustment on the throttle servo to set the idle. If this top screw is screwed too far up, the rotor (turning bit) of the carby will come out the end of the body.

'OWDIT GO?

Nothing left in the cookie jar except a few bolts and gaskets, so let's throw all the bits together and see how it screams. Running strictly according to the plan, I fitted an OS 8 plug and ran the engine in with 3:1 fuel (methanol and castor oil). After a break-in period when the engine would hold tune without sagging, I switched to 4:1 fuel and pressed on the loud pedal. Other than the dB test mentioned earlier, all prop tests were done with the muffler mute fitted and 4:1 fuel used. As I mused on earlier, imagine taking this engine back to, say 1950, and giving a demonstration to produce the following figures - you would certainly be in the bargaining chair.

8 x6 Taipan	10,600
8 x 4.5 Magnum	12,100
8 x 4 Taipan	13,100
7 x 5 wood	13,900
7 x 4.5 Magnum	13,600
7 x 4 Taipan	14,000
Reliable Idle	2,600

The engine started readily hot or cold, provided that the throttle was set at low idle. Two chokes are sufficient, a couple of flicks to get the fuel up and then one or two to start. Transition from low to high was very good and vibration is hardly noticeable.

A very pleasant little engine in all respects, with a wide range of uses and, given reasonable care, a long life expectancy.

WHY?

While I am on prop tests, a reader wrote to the Editor and asked why I used different props for the testing, and suggested that I use the same brand of props for all tests. Well, the fact is, I use different props to give you an idea of what to expect when you use **your** favourite brand of prop. If I used all, say, Bolly props, I am certain that I would get letters of complaint as to why I favour one prop and how would the reader know how the engine goes on his preference of prop. Not only that, I like to give all the prop manufacturers a little slice of the action so that it does not appear that I am favouring one brand. You can't please everyone all the time!

Engine for test supplied by **Model Engines** - the sole Australian OS distributor.

NOTICE TO ALL READERS

Under proposed changes to postal rates for Registered Publications, such as the magazine you are reading now, Australia Post proposes to introduce a new scheme called PRINT POST. Under the proposed PRINT POST scheme, postage rates for magazine subscribers will increase between 78% for postage within the same city to a staggering 223.5% increase to interstate country subscribers.

Obviously these increases are too large to be absorbed by us, and therefore there is only one alternative, an increase in subscription rates. Obviously you don't want postage increases above C.P.I. for a service that Australia Post has performed for the last 50 years under the Registered Publication scheme, let alone be forced to pay an increase in postage of up to 223.5%.

These increases will apply not only to the magazine you are currently reading, but EVERY REGISTERED AUSTRALIAN MAGAZINE you currently subscribe to, including registered club newsletters! HELP SAVE YOUR MAGAZINES.

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Senator Graham Richardson
The Minister for Transport and Communications
Parliament House
Canberra
A.C.T. 2601.

AUSTRALIA POST, PRINT POST PETITION

To the Honourable Minister for Transport and Communications:
The Petition of the undersigned residents of Australia draws to the attention of the Minister the precarious position of Australia's independent magazine publishers due to the recent decision by Australia Post to abolish the Registered Publications scheme and cause a rise of between 78.5% and 223.5% in postal charges (depending on weight and destination) for subscriber magazines over an 18 month period. For example, to mail a 300g magazine in August 1990 cost 47 cents under the Registered Publications scheme. It now costs up to $1.52.

YOUR PETITIONERS DEMAND, AS A MATTER OF URGENCY THAT YOU:

A: TAKE ACTION TO ENSURE THAT THE REGISTERED PUBLICATIONS SERVICE IS SAVED.

B: ENSURE THAT SUCH DISCRIMINATORY ELIGIBILITY CRITERIA FOR REGISTERED PUBLICATIONS AS COVER PRICE CEILINGS ARE FORBIDDEN, PLACING ALL AUSTRALIAN MAGAZINES ON AN EQUAL FOOTING.

C: REMOVES THE CONSTANT THREAT OF CRIPPLING PRICE RISES FROM THE INDEPENDENT PUBLISHING INDUSTRY BY ENSURING THAT POSTAL RATE INCREASES FOR MAGAZINES ARE SET AT 50% OF THE CONSUMER PRICE INDEX COMMENCING RETROSPECTIVELY AT JANUARY 1, 1990.

D: TAKES ACTION TO BAN DISCRIMINATORY PRICE LOADINGS FOR INTERSTATE AND COUNTRY SUBSCRIBERS, GIVING ALL AUSTRALIANS EQUAL ACCESS TO MAGAZINES.

E: PROTECT DIVERSITY OF MEDIA OWNERSHIP IN AUSTRALIA AS A MAINSTAY OF OUR DEMOCRACY BY LEGISLATING THE MAINTENANCE OF THE REGISTERED PUBLICATIONS SERVICE AS A COMMUNITY SERVICE OBLIGATION OF AUSTRALIA POST.

Signatures with addresses to follow.

NAME	ADDRESS	SIGNATURE
....	....	....
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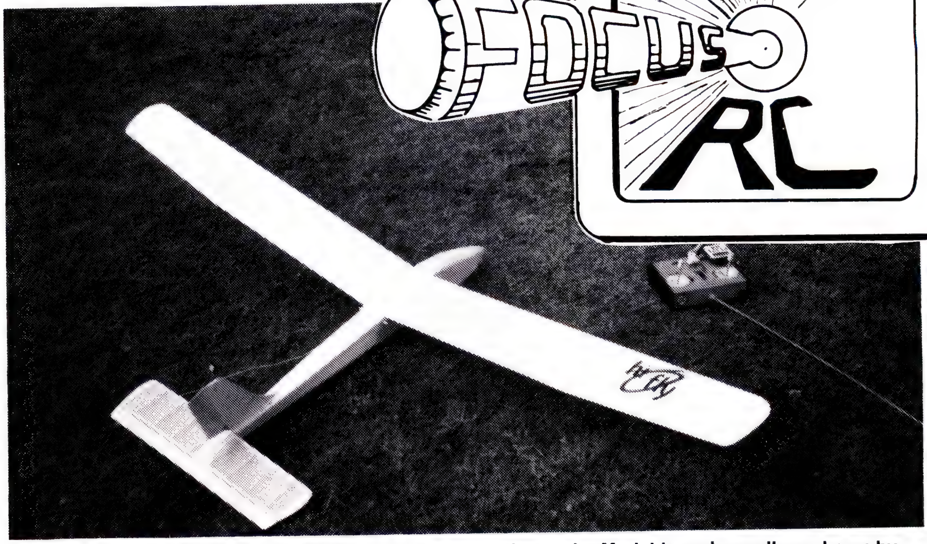
Precedent HI-FLY Glider

Introduction

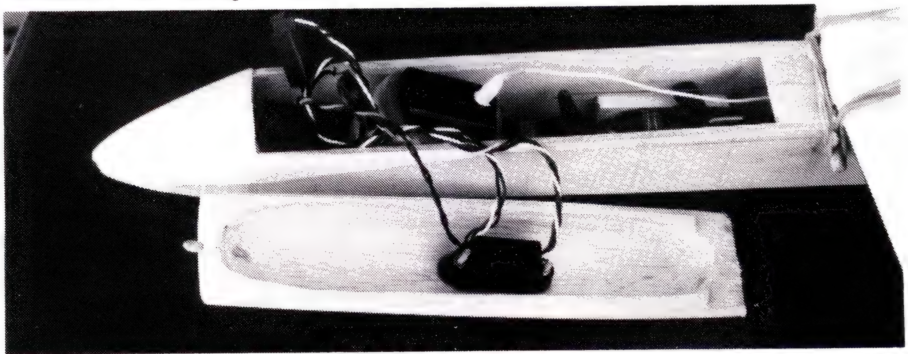
This small model is one of the least expensive of the glider kits that are currently available, and is very popular. Its performance is limited by its size but, properly built and trimmed, it is a good flyer. The rudder and elevator control responses are sufficient but require prompt manipulation when turbulence is encountered. The Hi-Fly thermals neatly, and fast responses enable the best to be gained from lift. As a slope soarer it is best in smooth air as the slope wind can drift it away quickly if it gets off-line. The Hi-Fly was found to be too heavy for a hand-launched glider, but this launch method does provide enough time to check the flying trim before trying slope or bungee style. As a motor glider with a Cox 049 on the pylon above the wing it gave the best performance, although the rubber band mounting allowed engine vibration occasionally. The engine run was good enough for good altitude to be reached, control under power was easy, and there was plenty of gliding time to search for lift.

The performance of the Hi-Fly was rather dependent upon keeping the wing loading as low as possible. In the review kit the sheet tailplane was too heavy and was replaced, and other lightening measures were used, reducing the wing loading at about 20 gr per sq dm (less than 7 oz per sq ft).

It was found that the model was even easier to fly with the area of the rudder increased and the elevator hinge line sealed with Magic Sellotape.



The Precedent Hi-Fly in its original form, showing pleasing style. Model is only small, as shown by old Futaba Tx. Rear fuselage covering wrinkled due to long cut-outs.



Installation of radio gear after mods. In-line arrangement is quite practical. Note hollowed hatch.

The Kit

The materials were well packed and consisted of die-cut plywood fuselage parts, nicely cut and finished balsa ribs and pine spars and balsa nose blocks. All the wing components were weighed before construction began so that the weights of both panels could be matched for lateral balance.

Building

Wing construction followed the simple assembly instructions. The parts fitted well except that the plastic tube for the single wire wing joiner was larger than the diameter shown on the plan so the holes for it in the root ribs needed to be enlarged.

The wing panels were removed from the plan before the top sheeting was added so that the leading edge could be shaped properly to accept the sheeting.

The **fuselage** parts were easily removed from the cieba plywood sheets and slotted together well enough for assembly to be done in the hand. Using cyano-acrylate glue this gives very fast assembly. The nose blocks were glued in place and shaped with knife and sandpaper in the usual way. The resulting fuselage was very, very strong, although there was some give in the tailboom where there were long cut-outs in the fuselage sides.

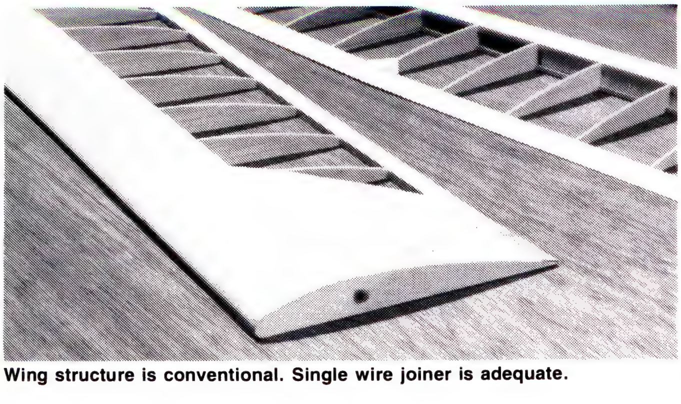
The installation of the **radio equipment** was particularly easy because of the large volume of the forward fuselage. The wire-in-plastic-tube pushrod was used for the elevator, and wire cables were substituted for the rudder pushrod.

The fuselage and tail were **covered** with tissue and dope, and the wings were covered with Glosstex. The model balanced slightly behind the position shown on the plan, requiring slight repositioning of the radio gear to obtain the correct balance.

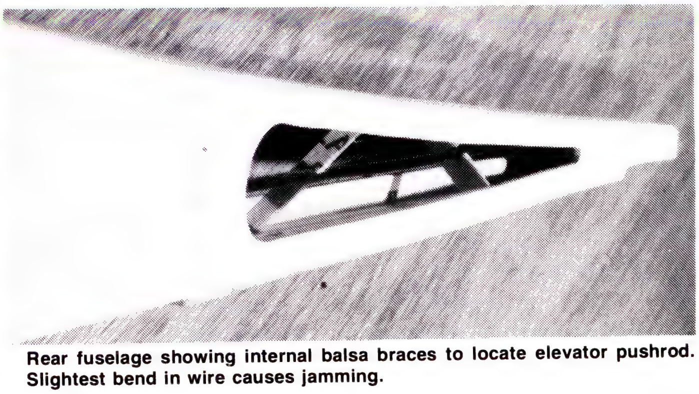
When checking the control connections it was found that the elevator pushrod wire was jamming due to a slight bend in the wire. The plastic towhook had been worn by landings and was replaced with a wire one, so a skid to protect the towhook is recommended.

The initial expectation with the Hi-Fly was of a fun flyer, since it is clearly not intended for contest work but for practice flying. Modifications were required to produce a model to match those expectations. The alterations produced a very good flyer.

O.G.



Wing structure is conventional. Single wire joiner is adequate.



Rear fuselage showing internal balsa braces to locate elevator pushrod. Slightest bend in wire causes jamming.

Scale Promotions

by Roger Minns

Bleriot Type 11 by Richard Bloor, depicting machine of No. 3 FRC squadron in France early in WW1. Span is 2 metres. Powered by an OS 90 FS. Scaled up from RCM&E plans. Pic from Wal, at the Nats.

How does one decide what to select as a scale aircraft project? Well, I have come to the conclusion that often it isn't the builder who actually makes this decision, but some other scheming 'promoter'. I would think that every model aircraft club has one Michael Edgley type of member.

The RCMC club in Sydney, of which I am a member, has one such knowledgeable aircraft enthusiast who fits this description. This particular person, not to be named, has a sneaky habit of supplying you with three-views, colour photos, magazine articles, newspaper reports, plans, sketches and so on of the most unusual aircraft ever designed and constructed, as rare and almost as extinct as the northern hairy nosed wombat.

I am writing this article to warn unsuspecting fellow modellers of this kind, who will con you into building odd types of aircraft, taking months of labour and hundreds of dollars, much to the delight of the hobby shop proprietors. However, if the aircraft conforms well to scale, finish and colours of the original, and also flys satisfactorily, much joy can be had from the project.

I have been duped twice by this scheming individual.

The first project was a 1/3 scale Currie Wot 3 single-seat biplane which has been to the Shepparton Mammoth Scale Fly-In on two occasions. This home-built aircraft, GA-PNT is the only remaining of three that were built by John Currie, the first two designed and built in 1937 and the third by the Hampshire Aeroplane Club, Eastleigh UK in 1958.

Some difficulties were experienced in the construction of this model, as detailed drawings were not available. It was scratch-built from 3-view drawings and sections by J.O. Isaacs, enlarged to 16 times. This 1/3 scale model of the Currie Wot 3 has the following dimensions: wingspan, 2.26 metres; length, 1.93 metres; weight 10.9 kg; Clarke YH airfoil; wing loading of 24 oz per sq ft; OS Gemini 160 twin cylinder 4-stroke engine; 18 x 6 inch (450 x 150) prop.

The second promoted project is a 1/4 scale Arrow Active Mk2 single-seat, folding sesqui-winged bi-plane, which I hope to fly at Shepparton this year. Once again, a rare home-built aircraft, designed and built by Arthur C. Thornton in his factory, Arrow Aircraft (Leeds) Ltd. UK in 1932. This aircraft, registered G-ABVE, was the only one of its type ever built and resides today at Shuttleworth UK in flying condition. It has had several owners, one being Desmond Penrose, and various colour schemes and tail configurations. Only recently it has been repainted in silver with red markings, finished in absolute impeccable condition after seven years of painstaking restoration at Shuttleworth.

This aircraft, in its 60 years, has had a colourful history, having raced for several seasons and performed aerobatic displays all over the UK in the capable hands of the late Neil Williams. In 1932 it entered the King's Cup, providing a top speed of 137 mph, but was unplaced. In 1957 the Arrow Active was restored after almost 25 years in a loft in Yorkshire. This was done by Norman Jones of Rellosons, who had the small Gypsy 3 120 HP engine replaced by a Gypsy Major i.c. of 145 HP. It then entered service with the popular Tiger Club at Red Hill, where it was flown by only a select few.

It was classified as an Historic Aircraft, and had its first race win in 1962 in the John Morgan Air Racing Challenge Trophy, and later won the 1965 Kent Messenger Air Race. It was also placed second in the 1980 King's Cup, being flown by Desmond Penrose.

Construction of the model of the Arrow Active was carried out from 1/8 scale free flight plans by Flt Lt E.H. Norman, which were enlarged to 1/4 scale, giving the following dimensions: top wing span 1.83 metres; bottom wing span 1.52 metres; length 1.44 metres; weight 5.2 kg; 23 oz per sq ft; OS 91 Surpass 4-stroke engine; 14 x 7 inch (356 x 178 mm) propeller.

In the words of a previous owner, Lewis Benjamin of Benjamin Knitwear, "To fly the Active is an experience".

In the words of this writer, "Long live our Promoters who inspire". What will your next project be?

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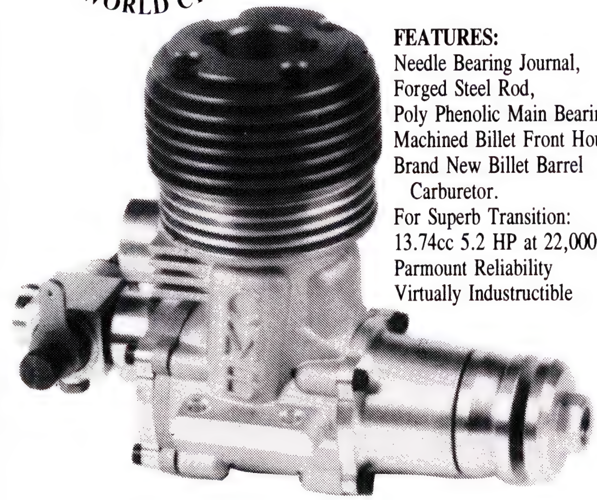

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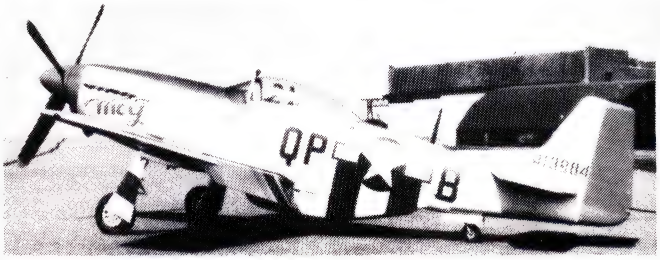

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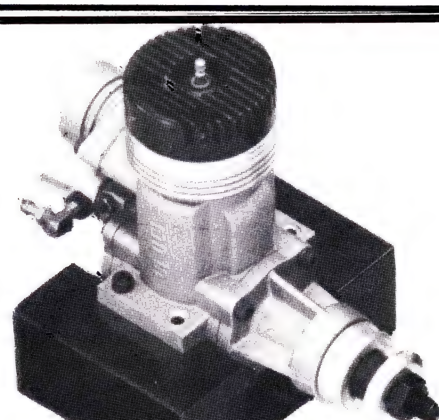

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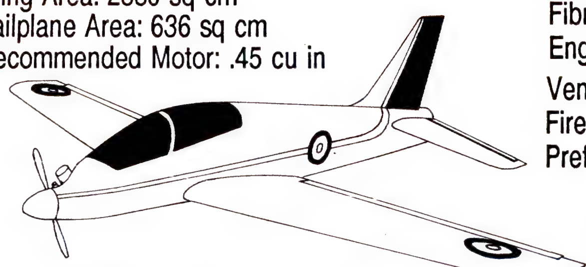

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CROSS COUNTRY GLIDING

About a year ago Peter Mather responded to Glenn Smethurst's letter in No. 104 with some ideas about extended distance flying. He stated that, for good cross country performance, he considered that the key features of the model were large size and a good lift on drag ratio (I am not going to use that other word, better used for drills and boring bits). However, he suggested that you start distance flying with whatever model you have, and go to larger (and larger) models as you are able.

Another important aspect of cross country flying is the need for a team, consisting of a driver, an observer, and maybe a navigator (one of these may also be the launch assistant), who can work together on a regular basis.

A special vehicle such as a utility with arm chairs secured in the tray would be great, but an ordinary car is often used, with the transmitter antenna out the passenger side window, and the model flown off to the side so that it is kept in sight.

Getting away from the launch field is as easy as going as high is as visually comfortable in lift then setting off in the correct direction, slowing the air speed of the model when lift is encountered, flying faster than cruise through sink, and stopping to look for lift when getting low. When a landing seems imminent, the crew should help in finding a clear area in which to put down.

Start with a 2 km goal and increase the distance, or return to base, as you gain experience and when the weather is suitable. A light breeze is often helpful, especially down wind, but a strong breeze makes it very difficult to gain any distance against it.

Peter has used his own ideas to good effect, as shown in this report from Tim Mellor.

THE GREAT CAIRNBROOK CAPER, 1992

Over the March long weekend, in Traralgon, the Cairnbrook Caper Cross Country Gliding event was held again. This event has been running, with mixed success, for about eight years. Over the last few years the entries have been on the increase.

Saturday 9th March

This was supposed to be the first day of the contest, but at the advertised start time it was postponed until the next day due to the conditions being "too good".

Following is a list of the major achievements for the day:

Rob Benton - After many years of trying, Rob finally achieved a 10.2 km goal and return flight, to conclude his LSF Level 5 (3rd in Australia).

Max Haysom also achieved a 10 km goal and return flight, to add to his card for Level 5.

Scott Lennon concluded his Level 4. This was done with a one hour 'test flight' and a 2 km goal and return.

Ralph Learmont finished his LSF level 2 after eight years. Does this now mean that he is an 'intermediate flyer'??

Peter Mather - this has to be the Endurance flight of the weekend. Peter smashed the long-standing VARMS straight line distance record by flying 32 km in a straight line. The flight lasted 2 hr 41 min, and covered 40 km by road. All that stopped him from going further was a lack of battery power and a swamp in front of him.

That evening at the local hotel a very social night was held, and as the night went on and the champagne flowed, the already tall stories of the day got even taller.

Sunday 10th March;
Task A - 4 km Goal and Return

This relatively short task presented some problems for most competitors, with only Ralph Learmont and Peter Mather completing the task. One competitor, who will remain nameless (right Max?), was seen catching thermals for about an hour, pushing back upwind only to be back to launch height, then to repeat this procedure again and agan ... Also of note was some very fancy flying by Scott Lennon who, on his final glide, doing about 60 kph, did a limbo under a power line then over a fence to finish within 1 metre of a very large post.

Task B - 8.7 km Downwind Dash

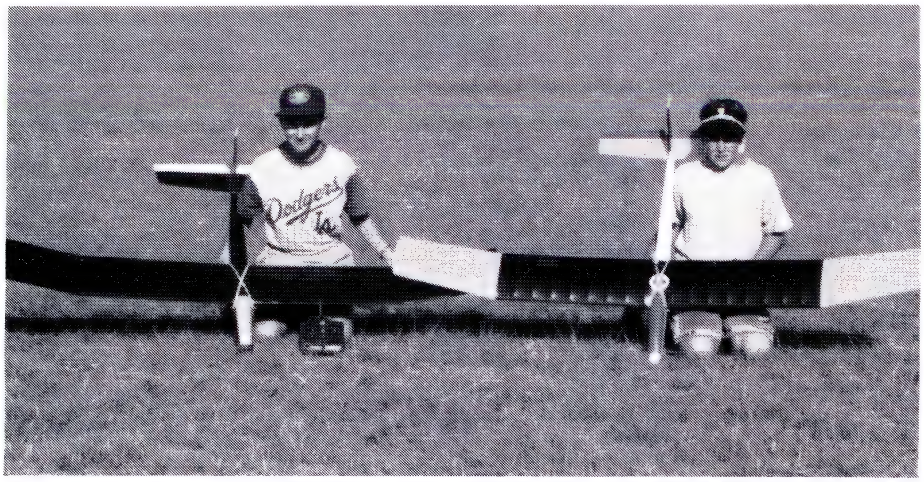
This task proved to be a bit easier, with 5 of the 8 competitors completing the task. The winning time was set by Rob Benton, who completed the task twice. His time was 20.42 minutes, for an average of 25 kph. Some people just couldn't come down, so Ralph (too lazy to dismantle his Eclipse) proceeded to fly back instead.

Monday 11th March
23.7 km Closed Circuit

This task was set to sort out the men from the boys, due to there being a 10 km into-wind stretch on the back leg of the course. By the end of the morning most competitors had made it to about 8 to 10 km around the course. While we were sitting around having lunch it was noticed that Peter Mather was missing. Shortly after, off in the distance, a glider appeared travelling at 999 feet towards us. Sure enough, Peter's model crossed the line with height to spare.

After the dust had settled and the thermals had faded, over 280 km distance had been flown, with most flyers having between 3 and 8 hours air time for the weekend. The types of models that seemed to be best suited for this event were the very large, lower aspect ratio models, like the

Bill Millgate, recipient of the Bruce Mitchell Memorial Award for 1992, with his scale model of the Slingsby T53B. Bruce Abell photo.



Wayne Bridges, 15 years old (left) of Muswellbrook Modelling Club, and Chris Graham, 12 years old, of Kiama Model Aircraft Flyers, with the models they flew at the Hunter Valley Championships. This was Chris' first competition. Well done boys!

	Task A	Task B	Task C	Model	Sniffer
Peter Mather	1000	874	1000	Sagitta X-C 5 m	Yes
Ralph Learmont	933	909	405	Eclipse 3.5 m	No
Scott Lennon	770	758	195	Eclipse 4.1 m	No
Tim Mellor	513	720	340	Apollo 3.7 m	No
Rob Benton	163	1000	366	Merlin 4.5 m	Yes
John Abbott	364	414	54	Prelude 1.8 m	No
Max Haysom	0	488	39	Sagitta X-C 5 m	Yes
Ron Bartlett	82	173	124	Cirrus 2.5 m	No

Results of Cairnbrook Caper, 1992

Best Team was Peter, Ralph and John.

Sagitta, due to their visibility at 999.5 feet. However, the higher aspect ratio models, like the Eclipse and Apollo, are faster in the glide. The use of thermal sniffers didn't seem to make a lot of difference to the results. Their main benefit is in picking up thermals while travelling at high altitudes.

For all of those who would like to have a go at Cross Country Gliding, next year's Cairnbrook Caper will run from March 13 to 15, 1993. On the Saturday we are going to spend ths day, hopefully, setting some new Australian gliding records, with the competition being on the Sunday and Monday.

VICTORIAN THERMAL STATE CHAMPS

This event was run at the VARMS Leakes Road site near Melbourne on April 12. By the start of the event there were 24 entries, making this contest Victoria's best supported for several years.

The contest was run to the Thermal Glider rules. These are: 8 minutes flying in 11 minutes working time; which makes the flying part of the competition more of a challenge than the 6 minutes that is more frequently flown. In all but one heat at least one competitor achieved the 8 minutes.

Only four rounds were flown due to a 90 degree wind shift, causing a delay due to changing the winch direction. There were a few surprises in the results, with Colin Collyer, flying in his first thermal contest in a few years, taking third place. The winner, David Hobby, flew an old hand-launched glider called an RO8, proving that you don't need a big multi-function model to win a contest, just a model with which you are practised and that suits the conditions.

Results

1.	David Hobby	4000
2.	Max Kroger	3977
3.	Colin Collyer	3915
4.	Tim Mellor	3848
5.	Ralph Learmont	3716
6.	Cliff Fiddes	3715

WING JOINERS

Those reports from Tim Mellor would have many potential cross country pilots wondering about structural aspects of suitable aircraft. A key point to be considered is the chance of high wing stresses when pushing the glider to the edge of its performance envelope. I included a spar analysis in a previous column, and a suitable follow-up is a similar discussiion about wing joiners by Bob Bayard from the October 1989 RC Soaring Digest.

CARBON Vs STEEL WING RODS

by Bob Bayard

Wing Rod Strengths

To measure the comparative strength of wing rod material I used the same apparatus that Reinhard Lahde and I had used in the wing spar study. This test set-up gives force readings which are equal to the tow line forces which would exist on a two metre model with typcial tapered planform. The test rods were ¼ inch diameter and were supported by ¼ inch ID by 4 inch long pieces of brass tubing epoxied into pieces of wood. To determine relative strength I would put a rod in the set-up and put a force of say 20 lb on the 'tow line', remove it and see if a 4 inch piece of the brass tubing would still slip over its length. The different measurements showed that a rod bent less that a quarter of a degree (1/64 inch in about 4 inches length) would let the tubing slide past the bend, but a bend of half a degree was too much. Each time the rod was put in the apparatus the force was increased by 5 lb until it wouldn't let the tubing slip over it any more. I counted the strength of a sample as the maximum 'tow-line' force that didn't bend the rod beyond the point where the tubing would slip over it afterward.

The drill rod was sold as being water hardened, but it clearly wasn't hardened. A hack saw cut it easily. Its strength was only 25 lb.

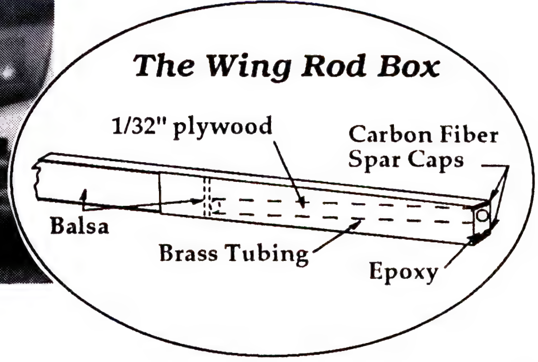
I took another piece of drill rod and hardened it by heating it to cherry red and quenching it in water without annealing it. At a 'tow-line' force of 50 lb it broke, a very brittle fracture. Another piece I hardened and then annealed. I may have annealed it at a bit too high a temperature - its colour is supposed to be gun-metal blue, but it went a trace past that. It bent rather than broke, but its strength was exactly the same as the fully hardened piece, i.e. 50 lb.

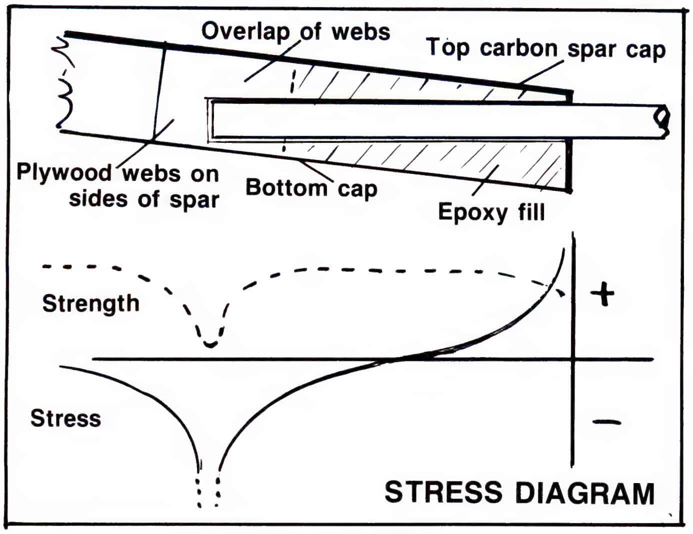
A piece of music wire was also tested. This material can't be hacksawed, at least with only one blade. Its strength was the best of the steel pieces; 75 lb.

I also tested a solid carbon fibre rod obtained from Aerospace Composite Products (Box 16621, Irvine, CA 92714). I had heard that carbon fibre was more than twice as strong as a similar sized piece of steel. If true, this would tax the test apparatus. However, it isn't true. My first sample went to 40 lb without incident, but at 45 lb it failed. The failure was in compression of the fibres at the top of the rod, the place of maximum compression stress. To see if it was a fluke I broke two more samples. They failed at about the same force; one failing just like the first one, and the other by breaking in half.

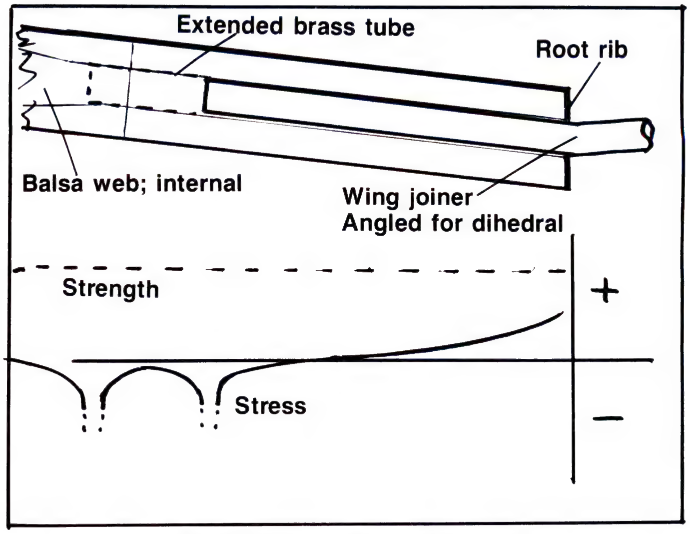
So, carbon fibre is not stronger that steel on an equal size basis. How about on an equal weight basis? My crude measurements showed steel to be nearly five times as heavy per volume as carbon fibre. So a reasonable comparison between carbon fibre and steel might be a carbon fibre rod ½ inch diamater vs a ¼ inch steel rod. (The ½ inch carbon rod would be four times as heavy as the ¼ inch one and it would have twice as much brass tubing as the ¼ inch rod, so the weight comparison between ½ inch carbon fibre and ¼ inch steel should be very close.) Assuming the theoretical ratio of rod strengths as a function of different size rods, namely the cube of the diameter, this carbon fibre rod should be eight times as strong as a ¼ inch diameter carbon fibre rod, or about 360 pounds. This is clearly overkill, as the rest of the system - the tow line, the brass tubing, the balsa or foam and so on - would probably fail in all sorts of ways

Peter Mather and Rob Benton with their big gliders at Cairnbrook farm. Rob won thermal glider (and Night Scramble) at the Waikerie Nationals. Photos from Tim Mellor.





WING JOINER BOX



ANGLED WING JOINER

before reaching that force. A more reasonable comparison might be a ⅜ inch carbon fibre rod against a ¼ inch steel rod. Again using the cube relationship between diameter and strength, this carbon fibre rod should tolerate a towline pull of about 150 pounds. This is twice as strong as the ¼ inch steel rod and yet the ⅜ inch carbon fibre rod would weigh less than half as much as the ¼ inch steel rod. The difference in weights for a typical wing rod set-up would be about one ounce. Of course, the carbon fibre would cost a lot more — $11 for a one foot length versus $2 for a three foot length of music wire.

Wing Rod Box Strength

To see if a typical rod construction would tolerate the kind of forces Reinhard and I were able to develop in carbon fibre spars, I took our best sample spar and built a wing rod box at one end. The sample was ⅝ inch high and had a ¼ inch thick vertical grain balsa shear web, a .031 inch thick carbon fibre lower spar cap and a .080 inch thick upper spar cap, both caps being ¼ inch wide.

The wing rod box was very simple (see sketch). The balsa shear web stopped 4 inches from the end of the carbon fibre caps. A piece of 1/32 inch plywood was glued to each side of the spar over those four inches and continued over the sides of the balsa shear web for an additional inch. A 4 inch length of brass tubing was inserted between the two pieces of plywood and the empty spaces around it filled with epoxy.

With a music wire rod carrying the load, this sample took 70 lb without incident. At about 80 lb it gave way. The failure was the same sort (and at the same force on the 'tow-line') that Reinhard and I had found for the equivalent carbon fibre spar, namely, shear web failure and upper spar cap buckling. Although the music wire rod had bent to nearly a four degree angle, the wing rod box assembly was completely unharmed!!

It has long been recognised that wings fail under load mainly at the end of the wing rod joiner. In this case the diagram shows why: at the end of the joiner the wing is actually weakest, the situation being compounded because the tube for the wing joiner also ends at the same point. The lower diagram shows that when the joiner is parallel to the spars their strength can be maintained. Then, if the tube is extended beyond the end of the rod, and if supporting spars within the wing box are extended further into the wing (and perhaps tapered beyond the end of the tube), the bending and shear stresses are distributed much better, instead of being concentrated at the end of the wing joiner. Since the stress is actually maximal at the root rib, the joiner may be tapered and the wing box coned to suit the taper. Free flighters now have mathematical analyses for this problem.

1992 HUNTER VALLEY CHAMPIONSHIPS

Held on the first weekend in March, the Hunter Valley Championships have been running since 1954! They include RC, FF and CL events, and **all** events are held on the same field over the weekend. I competed in the RC Thermal Glider on the Saturday and Combined Free Flight on the Sunday, so it will be a few days before I fully recover, but it was a most enjoyable weekend with a great bunch of aeromodellers, all having a great time.

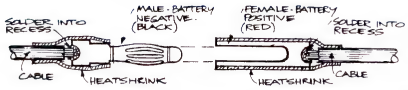
Conditions on the Saturday for the **RC Thermal Glider** event were most unusual. Lots of fluffy cumulus clouds (read 'thermals) and a breeze that did not exceed 5 to 6 kph all day, but very weak lift below launch height! In fact, very often the breeze would swing round to blow from a different direction several times during a flight, indicating thermals drifting through in different places. However, once a model gained an altitude of around 1½ times launch height the lift strengthened and could be worked to good 8 minute flights. Even then, though, it could be very flukey and would occasionally die.

This seems, to me, to indicate that, under the very calm conditions, the thermals were breaking away in fairly small bubbles that were weak but plentiful and only became strong when (and if!) they joined up as they got higher. If any knowledgeable readers have an explanation that either confirms or corrects this supposition of mine, I'd be most grateful to hear from you so that we can share the knowledge in this column.

There were 28 entrants in the competition, ranging from a state-of-the-art Waco Magic (lovely aeroplane!), Vikings and other large floaters to a basic 2 metre birds. One would have thought that conditions favoured the large floaters, however, this was not so as the flukey conditions favoured the pilot who could stay with it until it took his model up into the stronger lift. In other words, pilots had to work hard to win their heats and, to me, this is the best type of day.

In the end I managed to win the event with my OD Dragonfly (3959 points), followed by Colin Cox (3950) flying a Multiplex Fiesta, with Murray Souden (3909) flying an Albatross in third place in his first ever competition! Well done Murray.

TRADE NOTES



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G51 CL

SUPER TIGRE™

Introduction

The current series of Super Tigre engines have a distinctive appearance with a deeply-finned, somewhat squarish head and compact crankcase. Internally they have the same quality of design and finish that has made Super Tigre engines top class performers for four decades.

The G51 is clearly intended for use in control line pattern, and with the steady trend to larger models in this class since the production of the ST 46 ceased several years ago, Super Tigre will be hoping that this new engine can become as well accepted as its predecessor.

Dimensional Details

The G51 is about 10% taller and wider than the current crop of 6.5 cc engines, but it is almost 25% longer and 20% heavier.

The cylinder head is retained by 4 screws, and has a domed combustion chamber 14 mm wide and 4 mm deep.

The 4.5 mm wide squish band appears to be flat. The head is grooved to sit on a substantial flange on top of the cylinder liner and a thin copper gasket allows some compression adjustment.

The liner has standard Schnuerle porting, and the exhaust port is bridged. Its wall thickness is 1.5 mm.

The aluminium piston has one ring 1 mm from the flat crown, that has the position of the ring gap marked on it, and the sides have a matt finish, probably for oil retention.

The con rod is machined, bronze bushed, with two oil holes in the big end, and runs in a groove in the crankcase for the bottom half of the cycle, so that it cannot be lifted off the crankpin around BDC. The gudgeon pin is retained in the piston with wire circlips.

The crankshaft is a very tight fit in the two ball races, and was not removed for measurement. The solid crankpin is 6 mm in diameter. To improve the reciprocating balance, the crankweb is partly machined away each side of the crankpin leaving a full disc of metal on the front face. The shaft is 13 mm in diameter, stepped down to 7.1 mm through the front bearing and down to 6.4 mm for the propeller retaining washer and nut. This means that propellers have to be reamed to 7.1 mm for 6.5 mm from the rear of the hub.

The crankcase is a substantial casting, superbly sculptured, with a bead-blasted finish on the outside and a mirror machine finish inside. The prop driver is retained by a split collet, and the driving face is embossed rather than engraved for its grip on the propeller.

The cast backplate is quite light, and sealed with an O ring. The intake venturi is also sealed into the throttle spigot with an O ring, and retained by a spring-loaded clamp bolt and brass nut. The mounting lugs are 5.8 mm thick.

The venturi is turned aluminium with plenty of wall thickness in case the internal diameter needs to be increased. The brass spray bar is 4 mm diameter with one hole facing downwards. The steel needle valve is finely threaded to screw into the spraybar, and locked with a brass nut screwed onto the outside of the spraybar.

The muffler is the typical Super Tigre style with a separate manifold that is screwed onto the engine, and a large expansion chamber clamped onto the manifold, its position having considerable range of adjustment.

Performance

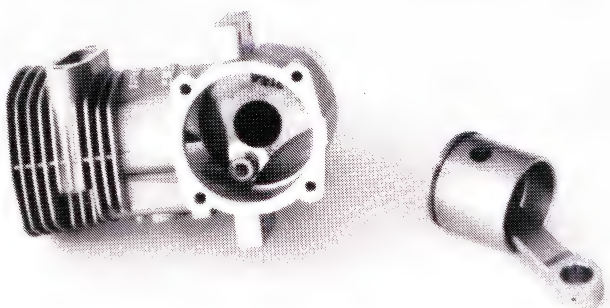
Being a control line engine the porting has been altered to suit. This results in a very special performance that shows clearly in the propeller tests. Furthermore, the use of the G51 as a CL pattern engine is considered to require about 22½% oil in the fuel and no nitromethane. The test engine was set up and given several short runs using 5% nitro fuel, then for the performance tests the no nitro fuel was used.

All starting was done by hand using the standard glo plug supplied with the engine and a single cell nicad accumulator. Starting was not always immediate, but was easy enough on the special fuel; some nitro made it easier. The needle valve could be angled away from the propeller disc when clamping it into position, making adjustment fairly safe. The needle valve was not sensitive, the engine taking a couple of seconds to respond to a change in setting, thus providing a very steady, positive means of regulating engine speed.

The test results show that this Super Tigre could drive a large propeller with ease; a 12 x 6 at 10,000 rpm is excellent. However, the engine did not gain as much as would be expected with the smaller props. A 10.5 x 6.5 should spin at up to about 13,000 rpm on a good 40, whereas the figure with the G51 was just over 11,000. The reason for this must be the modified timing and the no nitro fuel. This performance does not discredit the engine nor the manufacturer, because the G51 would 2-stroke on a 12 x 6 at about 10,000 rpm then drop back to a steady 4-stroke at just over 6,000 rpm, which is surely what the control line pattern flyer would want.

The economy of the engine seemed to be much better than for many 40s but was not actually measured.

It must be concluded that the G51 scores well from every aspect: built to last and built to perform. Super, yes; but not as dangerous as a



ST G51 crankcase is an excellent casting with superb internal machining. Shaft has large gas passage and full crank web that is partly ground away both sides of the crankpin. Piston has single ring; con rod has bushed bearings.

tiger. Several control line flyers have found the G51 to give just the performance they need for stunt, and tuning the propeller and fuel to suit a particular model can proceed without any concern about the power plant.

PERFORMANCE

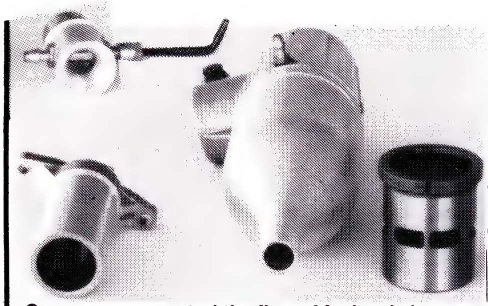
Propeller	RPM	
Initial Running		
11 x 6	10,500 2-stroke;	8,500 4-stroke
After 30 minutes running		
10.5 x 6.5	11,100 2-stroke;	7,300 4-stroke
10.5 x 8	11,100	
11 x 6	10,800	
11.25 x 6.5 3B	9,200 2-stroke;	6,200 4-stroke
11.5 x 6.5	9,900	
12 x 6	9,400	
12.5 x 6.5	9,800	
13 x 7	8,500 2-stroke	5,500 4-stroke

Specifications

Bore:	23.0 mm
Stroke:	20.2 mm
Capacity:	8.4 cc
Mass:	417 gram (inc. muffler)

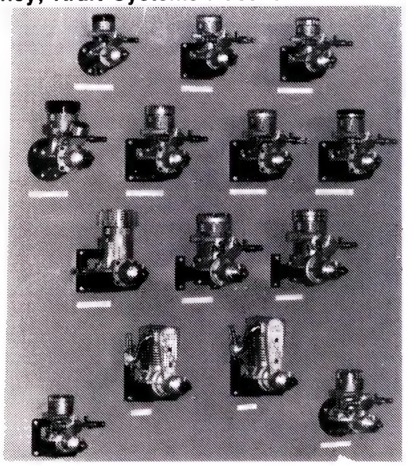
GAS PASSAGES

Intake venturi:	38.5 sq mm (less spraybar)
Crankshaft:	86.6 sq mm
Exhaust ports:	67.5 sq mm
Exhaust manifold:	201.1 sq mm
Exhaust outlet:	50.2 sq mm



Gas passages control the flow of fuel and air through the engine and thus govern power developed. ST G51 has small intake venturi, and small muffler outlet, centre.

At the recent Toy and Hobby Fair in Sydney, Kraft Systems Aust. showed off the



range of Webra engines it is now importing. The engines, renown world wide for their quality, range in size from .25 ABC to the 120 2 cycle, including the .80 Ducted Fan engine, while the 4 cycle engines range includes .40, .60 and .80 sizes. Trade enquiries to Kraft Systems Aust. 59 Ryrie Street, Geelong Vic., 3220. Phone (052) 29 2191.

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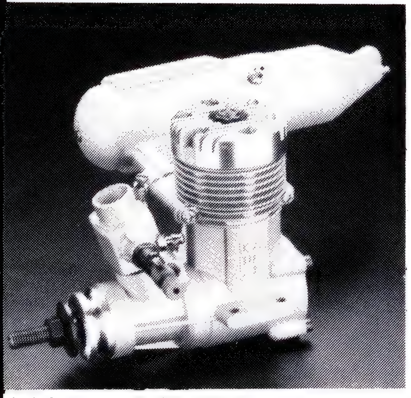

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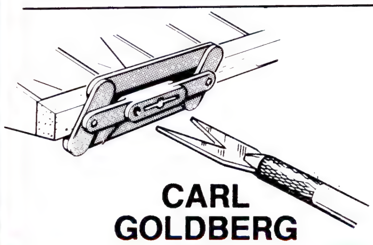

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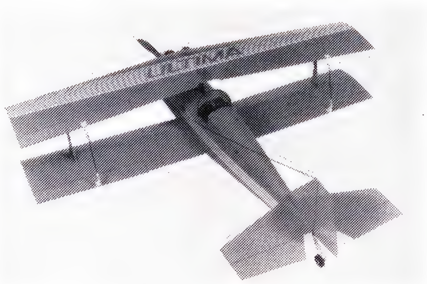

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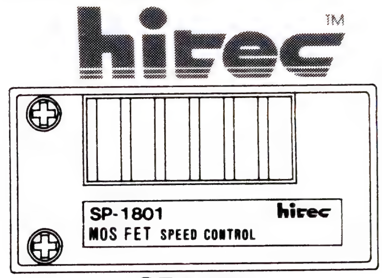

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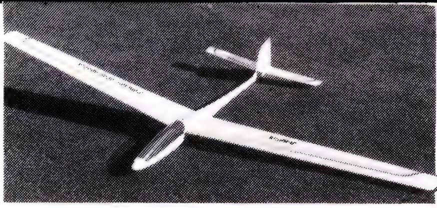

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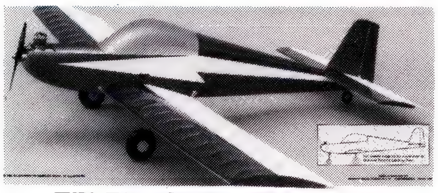

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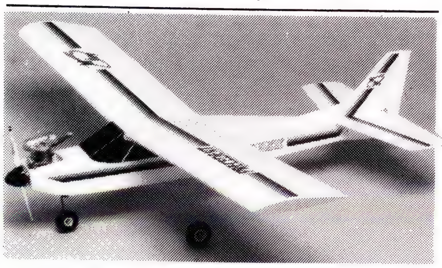

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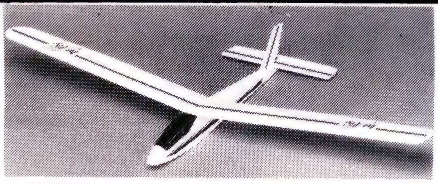

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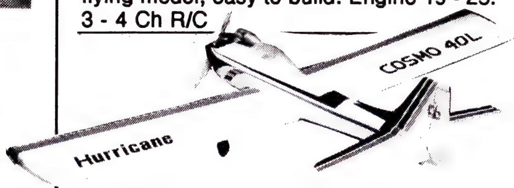

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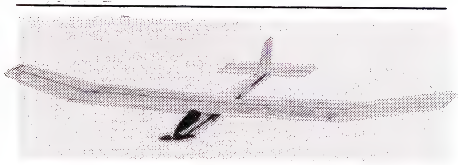

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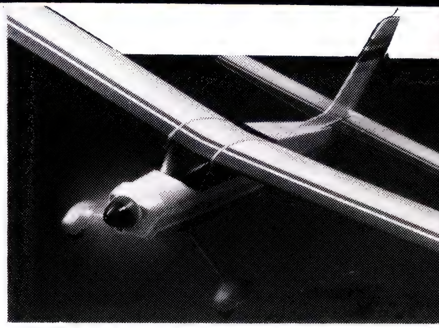

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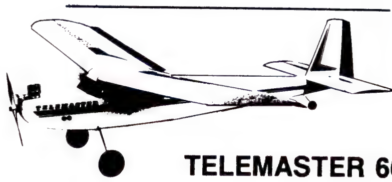

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RULES CHANGES

The MAAA has just concluded its Rules Conference. Those rule changes not affecting model design are effective with the issue of the minutes to the states (i.e. now). Those that do affect model design are effective after the 1993 Nationals.

It was apparently found necessary to specify that helmets must be worn on the head, with chin straps worn under the chin. The minutes report that some clowns have allegedly been strapping the helmet to their arm or having a chin strap on the helmet but tucking it inside the helmet instead of using it. Fuel shut-offs become mandatory in pretty well all racing classes, including Mini Goodyear, 2.5 Rat Race and Junior Rat Race. Vintage Stunt rules were finally agreed on, and the proposal for Bendix will be decided by postal vote. Younger Airborne readers who want to fly Junior Combat or Junior Rat Race should find this easier to do as they can now have anyone, senior or junior, start their engine. Previously it was juniors only in junior events.

The most dramatic changes were made to Junior Combat, Class 2 Team Race and Mini Goodyear, but just about all existing official MAAA CL events had at least some minor changes.

Junior Combat

The new version differs from FAI Combat in engine and model specifications, but is similar to FAI Combat in most other rules, including flying, scoring and safety rules. Each competitor may use only one model, engine, handle and set of lines per combat period, and have a maximum of 4 models per contest. Engines - 2.5 cc plain bearing only, venturi unrestricted, and must be fitted with silencer, except diesels. Models must have a fuselage (i.e. no flying wings) and an undercarriage with at least one wheel which remains in place. All take-offs must be rise off ground (ROG). Minimum line diameter .3 mm (common hobby shop lines). It sounds like an event for which your local hobby retailer can supply nearly everything you need.

Mini Goodyear

The model size is now 1/10; maximum engine size 2.0 cc (i.e. .12); line length 14.2 metres; suction fuel system only; 100 lap heats and 200 lap final, with 2 and 5 pitstops, respectively. While, of course, any engine meeting the capacity limit may be used, it is intended that the resasonably priced, over-the-counter .11 glow engines be the mainstay of the event, as well as 1.5 cc diesels and dieselised versions of the .11 engines. I trust that peer group pressure will keep in check the temptation that some may feel to sleeve down a $300 .15 racing engine to .11 capacity. It is intended to draw up some ready-to-use plans of 1/10 Mini Goodyears and have them available through the Airborne Plans Service. In the meantime, you can scale up any 1/12 Mini Goodyear plan to 120% or scale down any 1/8 Goodyear plan to 80% to get a 1/10 scale outline.

Australian Team Races (Class 2)

There is no longer any minimum engine size and you can either build to the 3.5 cc maximum engine size limit and fly on .34 mm lines, or to the 5.0 cc maximum engine size limit and fly on .40 mm lines. Pull test is now a more sensible 20G, amd no minimum engine capacity applies. This leaves the event wide open for experimental approaches, while those preferring to stick to the traditional 5 cc model can still take part.

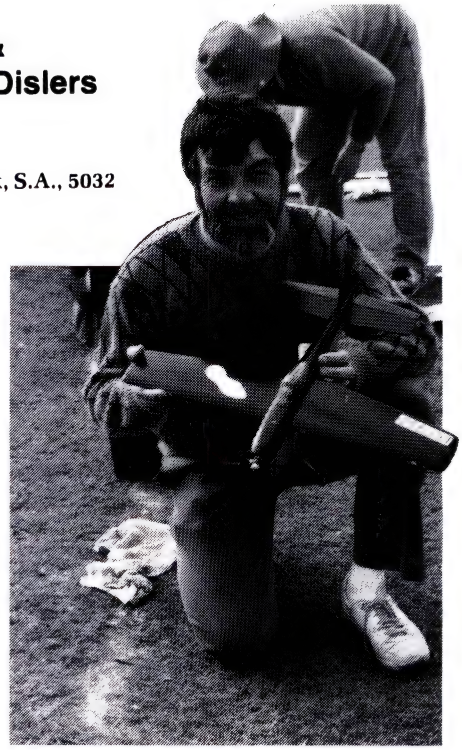
Proto Speed

As it is intended that Class 2 Team Race models be used, the necessary changes were made to be consistent with the new Class 2 specifications.

FRANK COOMBS' ADJUSTABLE & REPLACEABLE UNDERCARRIAGE

Reliable landings are an essential part of a good racing model and are mostly determined by the position of the wheel relative to the balance point or centre of gravity. If it is too far back the model will tend to nose over, but if too far forward the model will bounce when landing and be hard to catch.

To confuse things, the correct wheel position is different for grass (a more forward position is needed) and tarmac (where it should be forward of, but almost under the CG). The wheel is shown in its short grass position as used at the SA State Champs. The undercarriage (u-c) leg can get accidentally bent during heavy landings, and it is much easier to straighten properly when removed from the model than in situ with a pair of pliers. Models intended for practice on a variety of flying surfaces should be built with either a plug-in undercarriage system (where different u-c legs can be used, depending on the surface) or you can try Frank's system.



Rory Thompson and PAW 2.5 powered Footprint Vintage Team Racer. Smile on Rory's face expresses what this event is all about. Baltrunas photo.

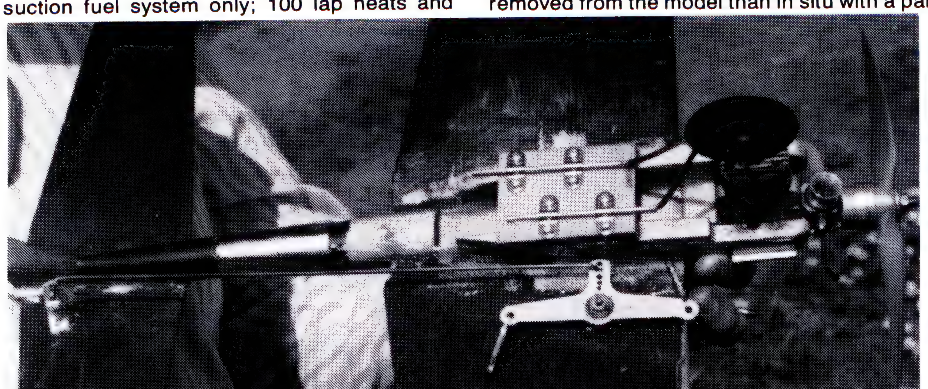
The advantage of Frank's system is infinite adjustment, and the u-c leg won't fall out, as can happen with the plug-in type. The drawbacks are that it is a bit more complex, and some models lend themselves better to the idea than others. Metal straps clamp the u-c in any desired position, and by loosening the clamp screws the u-c can be repositioned or replaced. Don't forget to retighten the screws. In the event of a heavy landing it may be prudent to check that it has not shifted back, although in practice this does not seem to happen under normal landing loads.

Sharp eyed readers may also spot the larger than normal bellcrank for a racing model. Frank swears that the 75 mm (i.e. 3 inch) bellcrank and long elevator horn give him smoother and more precise control than the more common 50 mm bellcrank or even smaller racing bellcranks. 80 pound rated Sullivan connectors give a neat, safe and low drag connection to the metal bellcrank. The line attachment holes on the bellcrank arms had to be enlarged to give a clearance fit for the connector, and the holes have to be reasonably close to the edge or else it overstretches the connector when hooking it through.

FUEL TANK TIPS FOR TEAM RACING

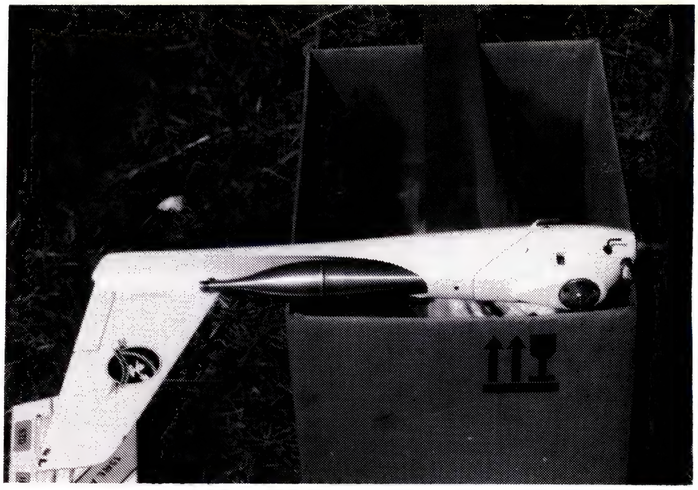
by Charlie Stone

There are a few of us relearning things that we should not have forgotten. For instance, that it is not as easy as you may think to make a tank for a Team Racer JUST the right size. Calculating the size and shape needed to give a volume of 15 cc (i.e. as for Vintage Team Race) is easy. Making it very close to that size is easy too. Then measure it. Curses; it is a shade too big - or not quite big enough. It is not a bad policy to err on



Here is Frank Coombs' adjustable mono-wheel prop saver. How simple can such a good idea be? Note an APC prop there, too. Coombs photo.

Australian F2A Speed Team after winning the TT Speed event. Left to right: Maris Dislers (proxy for Ivars Dislers), Robin Hiern and Graham Burgess. All used Irvine 15s. Photo from R. Hiern.



Brian Howser's (NZ) TT Speed entry. Note removeable front part of cowl and white colour for best visibility. Irvine 15 and pipe. R. Hiern photo.

the small side - you don't get disqualified for that. It isn't unknown for race scrutineers, when checking tanks, to get a different result from the owner. Someone that I know was preparing a Team Racer for the Nationals some years ago. Since he worked at the Government Chemical Laboratories at the time, it was no trouble to get a highly experienced chemist to check the capacity of his tank very accurately indeed. The view of that chemist was that the tank was just under the maximum size, but the scrutineer at the Nats said that it was over size. The word of the race scrutineer is the one that counts; and so it is off to the anvil to panel beat the offending container down a size or two. That is, of course, if you can get at it. With those Vintage Team Race models that have built-in tanks, making it slightly under-size might be the safest policy.

SOURCES OF CL COMPETITION GOODIES

Four your Australian event needs, i.e. Goodyear, Rat Race and Vintage Team Race, I would suggest getting in touch with **Dream Team Products,** 66 Olive Street, Yea, Vic., 3717. John Hunting will make a tank to one of his proven designs, or build it to your specs for between $7.00 and $14.00, depending on size. The prices DTP ask for their tanks and other products seem to be very reasonable to me.

F2C Team Race fuel tanks and (cylindrical style Kalmkov) F2A speed tanks, as well as F2C elevator horns and bushings are now available from **Engines from Russia,** 12 Heathland Terrace, Shaw Heath, Stockport, Cheshire SK3 8DU, England. E from R offer a host of items to suit the FAI CL classes and Goodyear.

Des McAnelly is now making a modern style F2A speed pan, with the ring at the rear. I believe that it is a casting which has the rear ring machined out to accept the tailboom. It is about 195 mm long overall, which should give plenty of room for any shape fuel tank. Quote pan type SA 5T. Des was using these on his models at the recent Trans Tasman and I am sure if you ask nicely he can provide a photo copy of the working drawing of his Desal 111 F2A model, which is designed around this pan. **McAnelly Castings,** 66 Otepuni Avenue, Invercargill, New Zealand.

APC props seem to be used by an increasing number of people, particularly in events where the rules disallow the expensive carbon fibre-epoxy props. The APC props may be a bit brittle for everyday combat, but for general sport flying and racing the 7 x 5, 7 x 7 and 8 x 5 are excellent sizes. They are available at hobby shops.

DIAL-A-PITCH

Sometimes the simplest of gadgets prove to be the best. This is a gadget that enables pitch adjustment without changing the propeller. Unfortunately, I can't claim any credit for this myself as it was apparently developed by the UK Speed Team. Dick McGladdery, who is a member of that elite trio, was kind enough to pass on the details. It has worked well for me and was an important part in my 279 kph effort at the Trans Tasman.

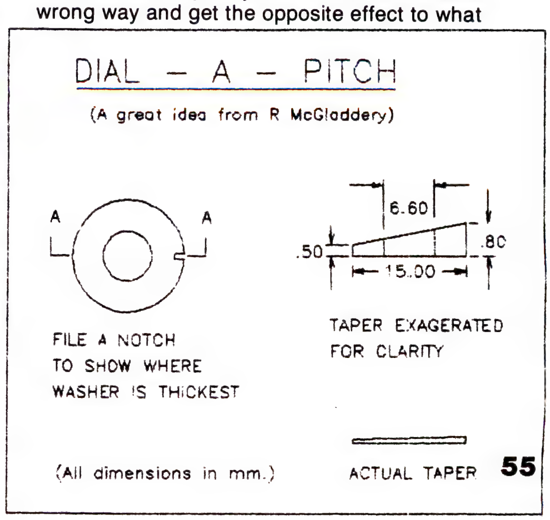
The Way It Works

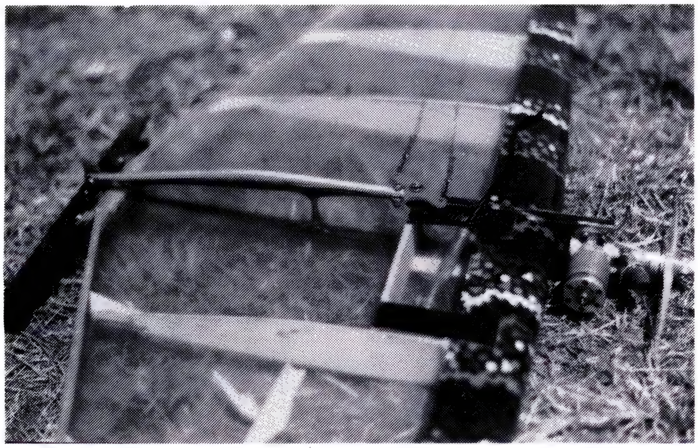
The tapered washer is positioned between the single blade propeller and the spinner backplate. The notch is used as a reference mark and the washer is initially rotated so that the notch is in line with the blade. In this position the prop blade is tilted forwards by the angle of taper but the pitch is unchanged. Let's call this the 12 o'clock position.

By rotating it counter-clockwise (viewed from the front) the pitch can be increased to the maximum possible with the notch at the 9 o'clock position. If you rotate it further counter-clockwise, pitch will start to decrease until it drops back to neutral again by 6 o'clock. From 12 o'clock, by rotating it clockwise, maximum pitch reduction occurs at the 3 o'clock position. At the limits of adjustment, a washer made to the dimensions in the drawing will give a plus or minus 1.14 degree change to every station along the blade. The resulting increase or decrease in pitch will not be constant - being greatest at the tip of the blade and least at the cuff. With 5.6 inches pitch at the 60 mm radius station, we can dial in plus or minus .3 inches pitch using the washer as shown.

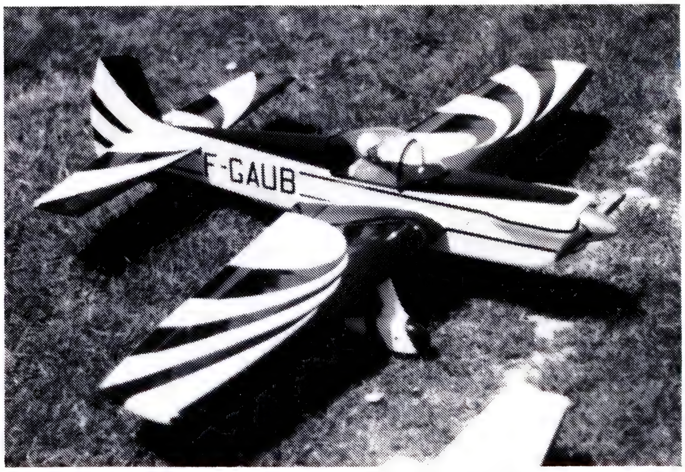
The advantages of Dial-A-Pitch include: you can get by with only a small number of good spare props and use the savings elsewhere; you can dial a prop load to suit unusual conditions on the day; and you can worry less whether you pitched your props perfectly, as a tweak on the washer will fix any small error of measurement. The limitations are: pitch distribution will alter; and it is relatively easy to rotate the washer the wrong way and get the opposite effect to what

Finalists in Vintage Team Race at the 1991 SA State Champs. Left to Right: M. Ellins-G. Wilson (Alien); J. Hunting-K. Hunting (Tracer); T. Deason-B. Deason (Shorty). Photo from A. Baltrunas.





New Zealand Russian style combat model at the TT. Paper and possibly kevlar thread re-inforced foam leading edge. Re-usable carbon fibre re-inforced centre rib. External control system. Aluminium tube pushrod. Note rubber tube on Nelson 15 venturi. Meant to stop dirt from getting in (in a crash). Photo by M. Dislers.



Kim Webby's (NZ) outstanding scale-like Cap 20L stunter at the TT. Detachable wing, tailplane and undercarriage. Weight 1.7 kg (60 oz); wingspan 1520 mm; OS 50 and own internal muffler using scale exhausts. M. Dislers photo.

you wanted, particularly when the CD expressionlessly counts down the seconds for you to put in your flight.

Making Dial-A-Pitch

Making one should be straightforward, although Robin Hiern made the one that I used. All I did was skim the outside diameter by Dutch turning and lap off the burrs. The taper angle could be precisely machined on a lathe, but an adequate version could be cobbled up using no more than a washer from the hardware store, an electric drill, a file and a small investment of time. Start with a thin washer with a not too loose fit on the shaft of your engine. (The outside diameter can be reduced to size by Dutch turning in an electric drill. Clamp the washer between nuts on a screw and chuck up the screw in the drill. Put on some safety glasses and grind down the outside diameter against a file.) Then file one side thinner relative to the other and file the notch. Get the reworked face flat by working it against abrasive paper taped to glass, checking thickness with a micrometer. The important thing is to have a small difference between the thickness of one side to the opposite side about the magnitude shown in the drawing. The actual thickness needs to be small but it is not critical.

NEW ZEALAND NATS RESULTS
from Andrew Robinson

F2C Team Race

Lewis-Coghlan	7:53.47
Williams-Low	197 laps
Bolton-Bolton	166 laps

½A Combat	**NZ Combat**
A. Wellington	A. Wellington
P. Coghlan	G. Lewis
R. Bolton	P. Coghlan

Classic A Team Race

Robinson-Robinson	10:50.54
J. Ryan	12:43.67
R. Bould	13:50.87

Classic B Team Race

J. Ryan	11:52.83
R. Bould	13:20.49
A. Hill	16:25.40

F2A Speed	sec/km	speed
R. Hiern	13.27	271.29 kph
A. Barnes	14.32	251.40 kph
B. Howser	16.15	221.91kph

Novice Aerobatics

A. Hamilton	313 pts
A. Wellington	206 pts
D. Robinson	154 pts

F2B Aerobatics

D. Rogers	2136 pts
J. Ryan	2035 pts
A. Lawrence	2004 pts

½A Team Race

R. Boys	9:04.9
A. Barnes	136 laps
R. Brown-R. Bolton	105 laps

Goodyear

R. Palmer-D. Palmer	11:32.49
Lewis-Coghlan	91 laps
D. Palmer-R. Palmer	80 laps

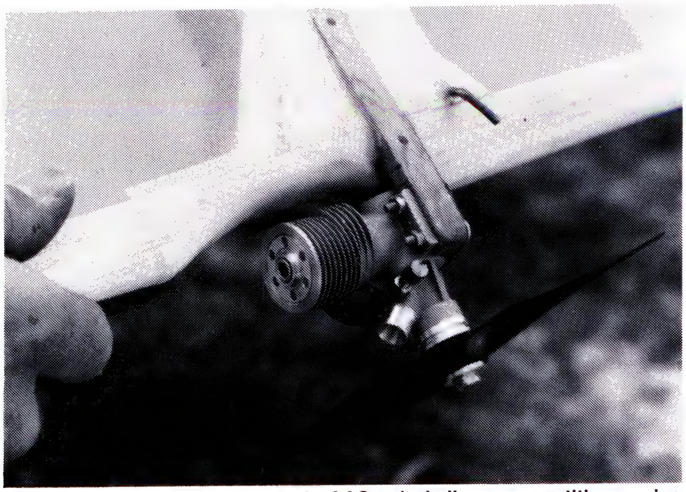
Vintage Midge Speed

M. Szeto	84.3 mph
R. Hiern	77.8 mph
J. Ryan	77.2 mph

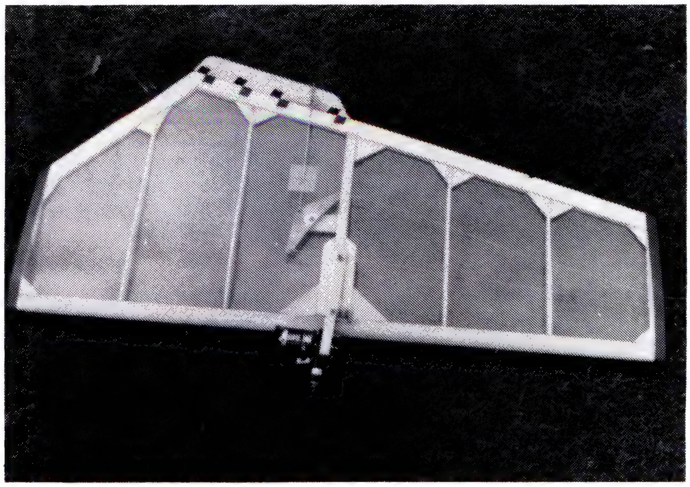
Vintage Old Timer Stunt

D. Sanderson	325 pts
J. Ryan	308 pts
J. Poletti	300 pts

Percentage Speed	Class	kph	% of NZ record
R. Hiern (Aus)	1	271.49	105.20
A. Barnes	2	250.52	96.73
D. Griffiths	1	238.89	92.57
B. Howser	1	234.38	90.82
Brown-Boys	½A	233.61	* 90.53



STELS 1.5 diesel. Superbly made AAC twin ballrace competition engine fitted to R. Tait's ½A Combat model. Almost too nice for this purpose. Photo by A. Baltrunas.



An experimental ½A combat model by A. Boltrunas. An echo of the differential chord theory in free flight years ago? Does this work? Even with that small elevator.

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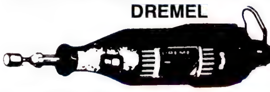

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Rotor Roundabout

by Max Tandy

FOR THE BEGINNERS
In Airborne No. 110 I outlined the purchasing requirements when starting off in helicopters. Now we have the follow-up, which details the procedure of teaching yourself to control the RC helicopter.

HOVERING A HELICOPTER
Unlike the normal aircraft, helicopters require to take off and land vertically, or, as we say, from the hover. This is the reason why you must first learn to hover your helicopter. Once the helicopter is stationary (hovering), it requires about 2 to 4 control commands every second to keep it stationary. I know that this sounds crazy; why move the controls if it is not going anywhere? The answer is that if you don't move the controls it will rapidly fly away!

I'd like to take some time out to show you something you can do, right now, which will very closely resemble the type of reactions and control inputs that are needed to keep a helicopter in the hover. Get a household broom and balance it vertically with the end of the handle in the palm of your hand and the broom head in the air. You will find that you are continually making small movements with your hand to keep the head of the broom still; almost the same as the corrections needed to hover a helicopter.

Now try this. Control the head of the broom so that it traverses one metre forward then stops (and hovers). If you can achieve this, I think that you will agree that you are watching the head and **anticipating your hand movements, to keep it under control, because you know** what will happen if you stop moving your hand. The similarity of this balancing exercise to operating the controls of a helicopter is remarkable, and what you have to learn when hovering a heli is to apply the appropriate control immediately it moves in any direction, including up and down. The satisfaction and enjoyment derived from practising hovering is very rewarding; ask anyone who has learnt.

Anyway, let's make a start. To begin with I will show you the manner in which to set up your helicopter to avoid damaging it during the learning process.

The Training Set-Up
Two items are needed here. The first is a good **training undercarriage** that is light (about 250 grams), springy, and preferably having a spread of at least one metre. If the training undercarriage (t.u.c.) is heavy it will have the undesirable effect of dulling the controls of the heli. When fitted it **must** be positioned with its central point **directly beneath the main rotor shaft.** This is important, as on numerous occasions the landings will be quite firm, and if the heli tilts slightly because of the incorrect positioning of the t.u.c. the main rotors can strike the tail boom.

The second item is a good **tail gyro.** It is possible to learn to hover without this device, but it's a bit like paddling upstream with a garden fork, and you may not get there! The attention to detail when installing a gyro can make a significant contribution to the ease of flying the model chopper. An in depth article on gyros and their installation appeared in Airborne No. 104, March-April 1991.

The Collective Pitch Range for normal flying (and usually recommended by the manufacturers) is often not appropriate for beginners. The instruction manual may suggest that the rotor blades be set at minus 1° pitch or at 0° at the full low position. This allows good position descents, particularly coming down in fast forward flight. You will find, when learning to hover, that there will be some occasions when you will need to land very quickly to avoid crashing, so, to prevent the heli from landing too heavily, these rotor angles at the full low position should be changed to about 1° or 2° positive. This can be achieved by using the end point adjustments of the modern heli radios, or mechanically by reducing the radius of the collective pitch servo output disc. Bear in mind here that in learning to hover you should only be about one metre above the ground, and to able to get back on the ground, when things are getting out of hand, merely by pulling the collective right back, is quite a blessing. This hurried and firm type of landing is further assisted by the springy type of t.u.c.. With this collective pitch set-up, and a good t.u.c., you will learn fairly quickly.

Swash Plate Adjustment. For hovering this is **not** dead level, and it will assist you in the early stages of flying to make a small adjustment to the control rods leading up to the outer balls of the swash plate, in the Roll plane. I feel that it is better to understand why this is necessary before making the correction.

Helicopters, model and full size, do NOT hover dead level. Depending on whether the rotors turn clockwise or counter-clockwise, the heli will need to be trimmed for a slight lean to the right (or the left) to help maintain a steady hover. The reason for this is quite simple. In the case of a clockwise main rotor (and most models are) the tail rotor is pulling to the left to oppose the tendency of the tail boom to rotate in the opposite direction to the main rotors. This left pull drifts the whole helicopter sideways, so to prevent this the main rotor (swash plate) must be trimmed a little to the right to stop the drift. (See Figure 1.) The actual amount of right tilt on the swash plate will vary from one type to another, however, adjust yours so that when viewed from the rear the swash plate is just perceptibly down on the right side. Shortening the right hand control rod to the outer ball by half a millimetre usually achieves the desired effect.

Adjustment for Take-Off.
Later on I will be recommending that the field that you choose for your first, say ten, flights (or tanks of fuel) will be very flat and level. If you have such an area then the following will be very beneficial to your success rate.

As previously described, the effect of the tail rotor pulling sideways tends to cause a drift to the left. This can become a nuisance during the learning stages and can be overcome to a large degree by having the heli sitting on the ground and actually tilting to the right, the same as in the hover. This is done by placing packing or washers about 1 mm thick between the normal undercarriage bows and the left side frame. Ideally, when viewed from behind, the main rotor shaft should be very slightly tilted to the right, and will oppose the left drift caused by the tail rotor during take-off or, to put it another way, it will be taking off in the same tilt as it hovers in.

The Training Environment
On your first day out the last thing you need is curious, casual onlookers. A friend or helper, yes; but avoid spectators. The flying area should be large, hopefully several acres of flat, level ground, short grass, and trees, if any, at a distance. A light, steady breeze of 5 to 10 kph will help to keep the tail straight for you. If the wind is coming through the trees or around large buildings, the air can be quite turbulent, even 100 metres downwind from them. Don't think that they will offer shelter from the wind - they won't!

The First Attempt at lifting off is preceded by a few simple operations that should be carried out frequently during the first couple of sessions at the flying field. On each take-off, the nose of the helicopter should be pointing directly into wind, with the operator (that's you) standing about 3 to 4 metres behind and to the side a little so that you can see the nose. When making control movements to control the tail rotor, you must watch the nose of the heli, not the tail.

Lining Up Into Wind should be done using the controls each and every time that it is necessary. By doing this it teaches you the relation-

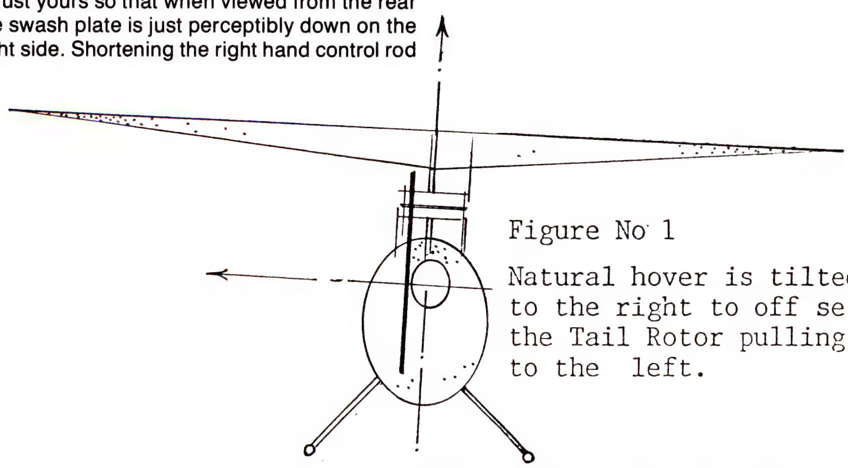


Figure No 1
Natural hover is tilted to the right to off set the Tail Rotor pulling to the left.

ship of the tail rotor control and the nose turning in a particular direction, even though you are still on the ground. In order to turn the heli without accidentally getting airborne, this is the procedure.

Assuming that the engine has been tuned according to the handbook (or see Airborne 108, page 88: Tuning the Helicopter Engine), and idling ready to go, with t.u.c. fitted, position yourself, as previously described, behind the heli and facing into the wind. The first turn will be to the left, so apply about half the total travel of the tail rotor stick and **hold** it there. Slowly advance the throttle and, as the heli becomes light on the skids, it will slowly skate around to the left. To stop it turning, reduce the throttle (not the tail control) back to idle, then release the tail control. Now do the same to the right: tail stick about half travel, then advance the throttle slowly to effect the turn. Be careful to always close the throttle before releasing the tail control otherwise you can find that your helicopter is airborne! The reason for this is that on a right turn the tail rotor pitch is very coarse and will hold the engine back, so releasing the tail pitch first will allow the engine to rev higher and ... Ooops! Airborne! Practise turning often, but don't get rough when you think you have it. Always turn slowly and skilfully.

Another little exercise that pays off is to operate the cyclic controls and observe the rotor head movement (on the ground). This teaches you to associate your cyclic control movements with the helicopter's directions - on the ground. To do this, position yourself about 4 metres behind the heli and crouch down so that you can see the flat plain of the rotors. Advance the throttle gently to about 20 to 25%, then **gently** ease the cyclic control forward and the spinning rotor disc will tilt forward as if to carry the heli in that direction. Holding the throttle at the same position, gently move the remaining cyclic control and observe the relationship between the stick direction and the rocking of the helicopter. The reason for these exercises is to help prepare you for quick control inputs later on when you need to apply them.

The First Lift Off.

I want to point out here that you don't get airborne and begin to control all four functions in learning to hover; that would be disastrous. The most important control to learn, and the first, is the height control. A helicopter does not just sit at a certain height: it requires continual and immediate corrections. Safety is being able to stay at the desired height of about one metre - then learning to control it in the horizontal plane. Therefore height control is our first priority. In order to do this we must ignore (and minimise) the tendency for it to drift around while attempting to maintain somewhere between a half and one metre height. The time spent in the air before having to land because of the helicopter gathering speed in a particular direction will depend upon the levelness of the ground on lift-off and the general trim of the heli. If the ground is not perfectly level, the heli will come off moving in the direction of the fall of the ground, and will usually continue gathering speed. Generally you would have 4 to 5 seconds of flight (holding height) before the time came to get back on the ground. Of course, the large spread of the springy t.u.c. allows you to dump it while moving along. The average time it takes to be able to control the height automatically, and that is what is needed before cyclic corrections can be concentrated on, is 4 to 5 tanks of fuel, each lasting for about 20 minutes.

Trimming the Tail Rotor before the first lift off is a fairly simple procedure. Face the heli exactly into the wind then slowly advance the throttle to a point where the heli just begins to shuffle on the ground. If the tail rotor trim is not correct, the nose will begin to turn immediately the shuffling begins, providing that the grass on your field is relatively short; about 4 to 5 cm. Now reduce the throttle gently back to the idle and move the tail trim lever in the direction that will oppose the nose turning and repeat the procedure until the nose of the helicopter does not continually turn in one particular direction. Should the heli fail to respond to either left or right trim changes, you should investigate and correct the problem before proceeding further.

All being well, the time has come for your very **first short flight,** which will merely be to gauge or feel the helicopter's response to the vertical control, and it should be a short lift to about knee height and straight back down. This will also serve to check that the gyro is in fact operating in the correct sense and not in reverse. There is a definite procedure that you **must** adopt to rise off the ground each and every time until you are able to operate the cyclic controls (forward, backward, left and right). This procedure will serve to minimise the natural tendency of the helicopter to drift away rapidly and require cyclic control inputs; you are going to be busy enough controlling its height. Here we go.

Les Gillibrand of Brisbane with his X-Cell 60. Power is from an OS 61 SFN, control is by JR 5 heli radio and JR 130 gyro. Happiness is a new chopper, right? Tandy photo.

With the nose directly into the wind, slowly advance the throttle to a point where the heli just begins to shuffle, and then **reduce** the throttle a **very small** amount, just enough to keep it stationary. Your thumbs (or fingers) should be lightly on both control sticks, but only moving the throttle. Now advance the throttle stick **positively** a further 3 or 4 mm, and immediately the heli leaves the ground pull the throttle stick back by about the same amount. Don't wait until you see that the helicopter is up to where you would like it before reducing the throttle or you could end up at twice the height intended. It is important that you rehearse these throttle movements in your mind before actually doing it.

Ideally the heli would have risen about half a metre, stopped and descended fairly quickly (the t.u.c. does work). Now reduce the throttle right back to the idle and assess the happenings. If you feel that the helicopter obeyed your control commands, repeat the take-off procedure, only this time, after it has left the ground, reduce the throttle a lesser amount, and you will have either a slow descent or it may stop still in the air. If it does, reducing the throttle a very small amount more will achieve a nice, soft landing.

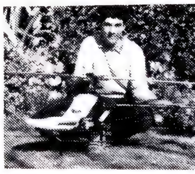
Each time you take off, ensure that the nose is directly into wind and that the height of the rotors does not exceed one metre above the ground. The aim now is to practise short but positive lift offs, pause and hold the height for a couple of seconds, then gently reduce the throttle and land. It is important to start every lift-off from the same point; that is, the rotors spinning very quickly and the heli about to lift. If you don't do this you will be chasing it all around the field.

Trimming the Cyclic Controls

By the end of the second tank of fuel you should be holding it in the air for about 3 or 4 seconds, and you will be drifting away, probably up to ten metres, and then landing (because it is gathering speed). This drifting is caused by two possible factors. The most likely is the slight fall in the ground, causing the helicopter to be very slightly tilted in a particular directiion on lift-off, and it will continue in this direction unless a cyclic command opposing it is applied. The rememdy is to find a flatter piece of ground if you don't want excessive drifting. If the ground **is** dead level, then the cyclic trims (forward, backward, left and right) may be used to help prevent drifting. If you are flying in a wind then you will need about 3 clicks of forward trim to prevent the heli from being blown backwards. Adjust this trim lever to suit the strength of the wind.

Introducing a cyclic correction in order to prolong the short flights is quite in order providing that you feel that you can put the helicopter down fairly quickly if the need arises. Plan on making a cyclic correction in ONE direction only in your early stages, and be content to merely extend your airborne time by 3 or 4 seconds. Plan the correction BEFORE you take off. Here

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X-Cells 1st, 2nd, 3rd, 4th, in Expert
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1st, K. Sensui flying a Kalt Aggressor
2nd, W. Mann flying and X-Cell 60
3rd, C. Youngblood flying and X-Cell 60

Results of the P&DARCDS Anniversary Champs are:

X-Cells 1st and 2nd in Expert and 2nd Place in Novice.

APOLOGY. . . In the previous issue we implied that our X-Cell Helicopters won the World Championships. This is not so. The American Team won and were flying two X-Cell 60 helicopters and one TSK helicopter. The outright winner was K. Sensui flying a Kalt Aggressor. Our Sincire Apologies to Model Engines (Aust.) and the Kalt Company of Japan.

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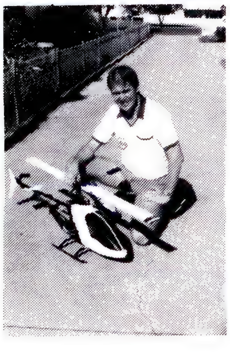


 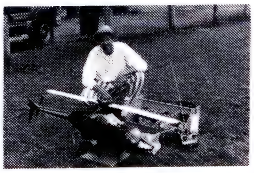  

is a typical example of what you should do. In most cases the heli will be drifting off more in one direction than another. This will help you to plan your correction because you can anticipate the appropriate control stick that you will use, and the direction in which you will use it to oppose the consistent drifting after take-off.

Beware of over-controlling when moving the cyclic sticks. Without exception beginners hold the required control on for too long and the result is that the seemingly senseless machine comes rocketing back at twice the speed of the original drift! It is not possible to tell you how much to move the control stick, and for how long to hold it on, but if you use the following as a guide you should not get into an uncomfortable situation.

Let's assume that your helicopter very often drifts off to the left very soon after take-off, and you have planned that the next time it does this you are going to stop it. If you have figured that by holding some right cyclic control on until the heli stops and then let the control stick neutralise, you would be absolutley **wrong.** It would stop the left drift OK, but the heli would proceed to rocket off to the right far more quickly because after you have tilted the helicopter to the right to stop it, the right tilt will still be there, and off it goes. The problem is, when you release the control stick back to neutral, the helicopter does not pop back level (unfortunately), and it requires another control correction to the left to put it level - then it stays put. Now, this is all too much for a novice heli pilot to do, and these precise control corrections will come automatically with practice. I am not suggesting that you attempt this method of correcting the drift until you have at least 2 to 3 hours of cyclic practice. What I am suggesting is much easier and practical for the time being. The precision stuff will come automatically later on.

OK. let's get back to the plan of opposing this left drift after the heli gets airborne. Be prepared to make a correction with the cyclic roll stick to the right, but wait for that left drift to occur. When it does, move the stick as soon as you can, by a small amount, say 2 to 3 mm, but only for about one second, then release the control and see what reaction you had from the heli. If it slowly came to a stop and stayed there for a few seconds then slowly drifted back, your control correction was excellent. If it came back a litle too quickly and had to be landed, you held the control on for too long. If nothing seemed to happen and it kept drifting to the left, you were a little light on correction both in amount and time. This method of correcting the drift is, of course, applied to all four cylic controls, and if you take this approach of trying a little correction, then adjusting the amount and the time held on, you will soon have the helicopter gently drifting around and you will be well on the way to successfully controlling this seemingly strange (but enjoyable) machine.

Keeping the nose into the wind has not been mentioned to this point for the simple reason that it is relatively easy. If you have been repeatedly using the tail control stick for lining up into wind before each take-off, as I suggested, then small directional corrections during the first 20 or 30 short drifting flights should be an automatic reaction. Should your first couple of flying sessions have been in dead calm air, then the nose of the helicopter would have required a lot of attention. Winds of up to 15 kph can be quite helpful in keeping the nose into wind, and it is quite safe learning in these conditions providing that the wind is not turbulent, as previously explained.

The method described here of learning to fly a radio controlled helicopter has been evolved from ffteen years' experience of flying and teaching people to fly them. Some less experienced people may feel that it is a conservative approach, however, it is successful, both in learning and the preservation of your helicopter. All that I have said will work for you providing that your helicopter is also working for you.

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Nicely packaged in a tailored foam box, the unit comprises three separate items permanently wired together with more than adequate lengths of lead which permits installation in a wide range of positions.

The components are housed in high quality injection molded plastic cases with easy access for servicing. The main gyro unit measures 42 x 34.5 x 39 mm, which is the same size as most other types. The amplifier is quite small at 52 x 36 x 15 mm, and incorporates a reversing switch. The remote gain and selector has the two adjusters for the dual rates but does not have a separate switch to isolate the gyro during radio on adjustments of the helicopter. This can be achieved, if necessary, by removing one lead from the receiver (to conserve batteries). The gain selector is standard size: 34 x 24.5 x 19 mm.

Inside the main gyro unit, the 16 mm ball bearing armature electric motor is suspended on a standard type of gimbal employing a ball bearing on one side and a plain bearing on the other. Although the unit reviewed displayed a somewhat less than perfect fit on the plain gimbal bearing, I attributed this to the well thought out design and positioning of the pick-up sensing device which is closer than normal to the ball bearing pivot. Good thinking, Mr. Hi-Tec.

The current drain of the supplied unit was measured at 140 mA, slightly higher than the maker's figure, however, this is consistent with other similar units. This gyro is designed to operate directly from the receiver battery, which the manufacturer recommends to be a minimum capacity of 1,000 mAh with a maximum of 4.8 volts. This would give an operating time of around 90 minutes.

In-flight testing was exactly as I had expected after playing with it for quite a while on the bench. It tuned up easily to the two rates. High rate gain was at about 60%, which was very good in the hover, and 30% on the low rate provided good, steady forward flight including aerobatics.

I must confess that I had some reservations when I was asked to test and review this product, thinking that the country of origin had not had a lot of experience in making such an item. This gyro works well, and continued good service can only be assessed after prolonged use, as with many such units.

With a retail price in the low two hundred bracket, it should be very competitive.

The gyro reviewed was supplied by Model Engines (Aust) Pty. Ltd., 57 Crown Street, Richmond, Victoria, 3121.

Electric Flight

By Phil STEVENSON

MEASURING MOTOR PERFORMANCE

A year or two ago I mentioned some experiments I was doing with Neodymium magnets in 05 sized motors. The initial performance test results I quoted at the time were very promising, and my experiments continued, both on the bench and in actual competition aircraft.

Several readers enquired about also using the powerful magnets, but I could not provide any quantitative evidence that they would get real value from buying and installing the expensive material. *(See the report in Airborne No. 110.)*

It is no use simply running a few different props on a variety of motors from a pack of cells, as the different armature winds and even the varied state of charge will yield a set of results like Table 1.

Table 1.

MOTOR	PROP	CURRENT (AMPS)	RPM
#1	6*3	10	15000
#1	7*6	18	10000
#2	6*3	15	20000
#2	8*6	28	10000

These figures do not mean a great deal, except perhaps that the #1 motor is not as hot a wind as #2. It does not tell us anything about the best use of the motors, or whether one will do a particular job better than the other. This led me into looking for a better way to accurately compare the performance of different motors.

At about that time Mitch Poling wrote some articles in his Model Builder electric column about motor performance testing, and this information started me on an extensive search on the subject, and a year of testing, retesting and development.

Because it is impractical to test every motor at a wide range of currents or cell counts, the work was based on the formulae presented by Mitch and others. The basic formula for DC motors is:

$$\text{Volts} = \text{Amps} \times R + K \times \text{rpm}$$

where R is the Resistance of the motor in Ohms, and K is the speed constant in Volts/rpm, and these two numbers are constant for any single motor. Another constant figure is the No Load Amps.

By running each motor only three times, it is possible to find these three constants for each motor. A bare shaft run gives the No Load Amps; and two other runs with different props or different cell counts, measuring the Volts at the motor, the Amps and the rpm, and after taking into account the No Load figure, provide a couple of simultaneous equations which can be solved for K and R.

These figures are then used to calculate the Input Watts, Output Watts, Efficiency, rpm and Torque for any combination of Input Voltage and Current. The input voltage is, of course, a direct result of supply cell count, but is also influenced by the current, because of the internal resistance of the cells themselves and the installation wiring, switch and connectors.

Table 2 shows the results of all those formulae. The last two columns show two theoretical props which would give the performance in the line adjacent; the diameter is in the column and the pitch is at the bottom. These are based on another formula which was developed from several theories and sets of test results, and was reported in Australian Electric Flight News #7. The figures shown closely co-relate actual test results, but only after a lot of formulae tuning.

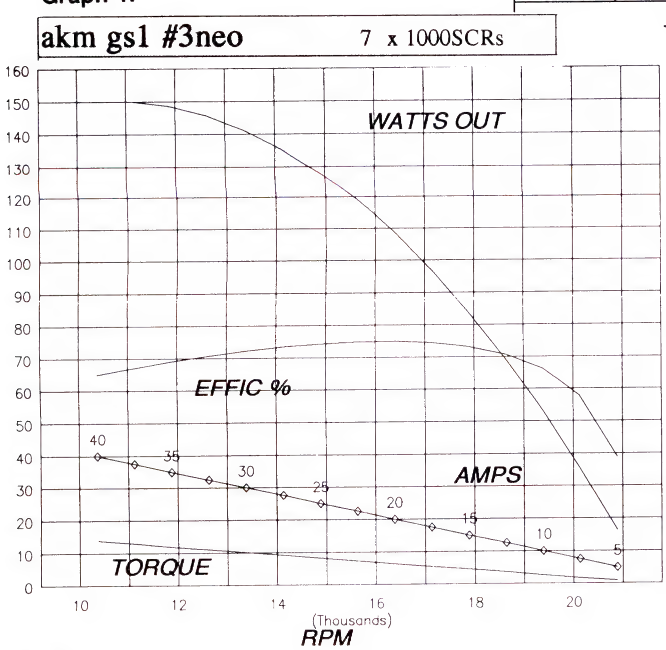
The motor respresented in the table is the one I have been using in my 7 Cell glider, and provides a very brisk climb at 35 Amps, since the model weighs only 800 grams.

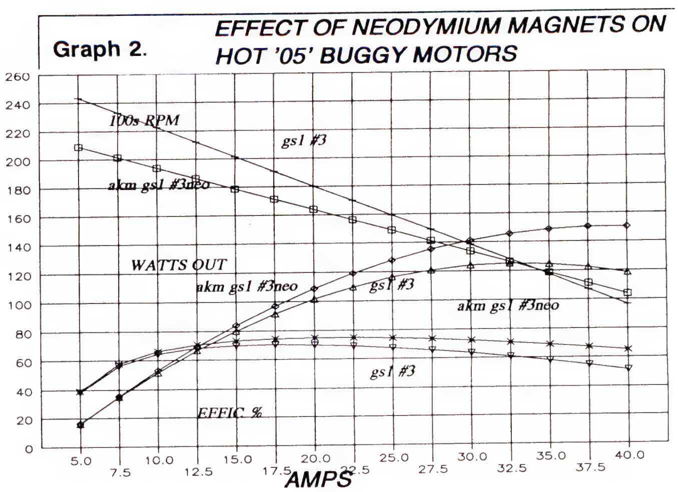
For those who prefer, the tabulated data can be presented graphically, as shown in Graph 1.

Table 2.

MOTOR:	akm gs1 #3neo							
date of test	*jan92*		*P. Stevenson*			7 x 1000SCRs		
AMPS	VOLTS	P IN	P OUT	EFF %	RPM	T N*cm	PROP Dia	PROP Dia
5.0	8.38	41.89	16.33	38.98	20887	0.746	3.3	2.9
7.5	8.19	61.43	35.41	57.64	20136	1.680	4.1	3.7
10.0	8.01	80.05	53.03	66.25	19385	2.613	4.6	4.2
12.5	7.82	97.73	69.19	70.79	18634	3.546	5.1	4.6
15.0	7.63	114.49	83.87	73.26	17884	4.479	5.5	5.0
17.5	7.45	130.31	97.09	74.51	17133	5.412	5.9	5.3
20.0	7.26	145.20	108.84	74.96	16382	6.345	6.3	5.7
22.5	7.07	159.16	119.12	74.85	15631	7.278	6.6	6.0
25.0	6.89	172.19	127.94	74.30	14880	8.211	7.0	6.3
27.5	6.70	184.28	135.29	73.41	14129	9.144	7.4	6.7
30.0	6.52	195.45	141.17	72.23	13378	10.077	7.8	7.0
32.5	6.33	205.68	145.59	70.78	12628	11.010	8.2	7.4
35.0	6.14	214.99	148.53	69.09	11877	11.944	8.6	7.8
37.5	5.96	223.36	150.01	67.16	11126	12.877	9.1	8.2
40.0	5.77	230.80	150.03	65.00	10375	13.810	9.6	8.7
						PITCH ins	3	4.5

Graph 1.





Here it is easier to see the maximum power output point, at 37.5 Amps, and the point of maximum efficiency at just under 20 Amps. (Maximum efficiency is normally at half the Amps of maximum power.)

After testing many motors and comparing the practical figures with the theoretical ones, refining the techniques and formulae, I eventually satisfied myself that any comparison between different motors would be meaningful. Then I was able to test the impact of the Neodymium magnet substitution which had initiated the whole process. Of course, the process is equally valid on tests of other motors.

Impact of Neodymium on 05 Motor

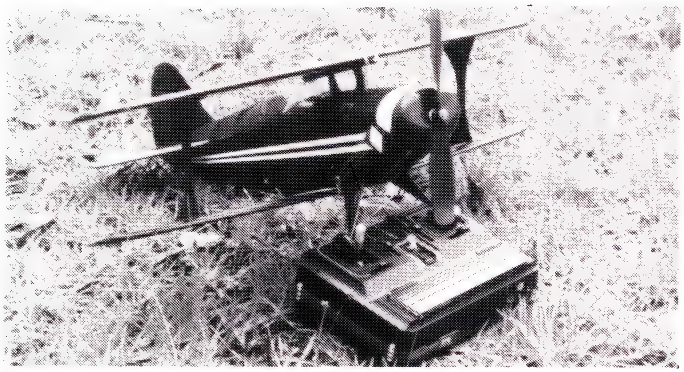
Graph 2 shows the impact on the performance curves of a hot 7 cell 05 motor by substituting a smaller volume of Neodymium for the standard Ferrite magnets. The format of the graph is slightly different, with Amps on the lower axis. This allows easy comparison of rpm, Watts Out and Efficiency.

The results are very much as expected, and as perceived from actually flying modified motors. The increased magnetic field has reduced the rpm at low currents. This is also the case with Cobalt motors.

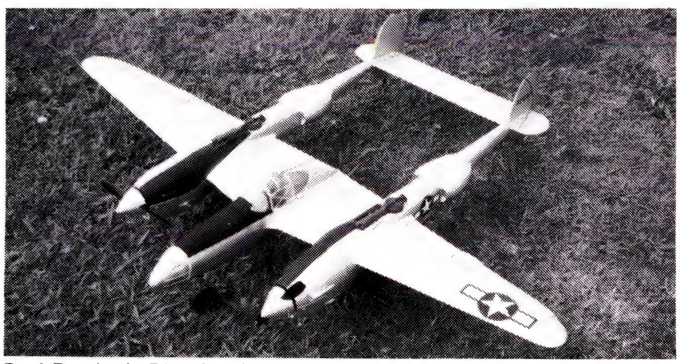
The impact on the Efficiency and Power Output are more significant. Both increase considerably as the current increases. The maximum power of the ferrite, 123 Watts at 33 Amps, increases to 142 Watts at 37 Amps with Neodymium. This is due to the twofold impact of increased efficiency at high currents and the fact that the peak is reached at a higher current. This feature is important in an event like 7 Cell Glider, where maximum power is required for a short period. In fact, the construction of these relatively

MOTOR:	rs 540 sh							
date of test		*mar-92*		*P. Stevenson*		7 x 1000SCRs		
AMPS	VOLTS	P IN	P OUT	EFF %	RPM	T N*cm	PROP Dia	PROP Dia
5.0	8.38	41.89	26.74	63.84	17490	1.460	4.2	3.8
7.5	8.19	61.43	43.54	70.87	16449	2.528	5.0	4.5
10.0	8.01	80.05	58.01	72.46	15409	3.595	5.6	5.1
12.5	7.82	97.73	70.15	71.77	14368	4.663	6.2	5.6
15.0	7.63	114.49	79.97	69.85	13328	5.730	6.8	6.1
17.5	7.45	130.31	87.46	67.11	12287	6.797	7.4	6.7
20.0	7.26	145.20	92.62	63.79	11247	7.865	8.0	7.2
22.5	7.07	159.16	95.46	59.98	10206	8.932	8.7	7.8
25.0	6.89	172.19	95.97	55.74	9165	10.000	9.4	8.5
27.5	6.70	184.28	94.16	51.09	8125	11.067	10.2	9.2
30.0	6.52	195.45	90.01	46.06	7084	12.135	11.2	10.1
32.5	6.33	205.68	83.55	40.62	6044	13.202	12.4	11.2
35.0	6.14	214.99	74.76	34.77	5003	14.269	13.9	12.6
37.5	5.96	223.36	63.64	28.49	3963	15.337	15.9	14.4
40.0	5.77	230.80	50.19	21.75	2922	16.404	18.8	17.0
						PITCH ins	3	4.5

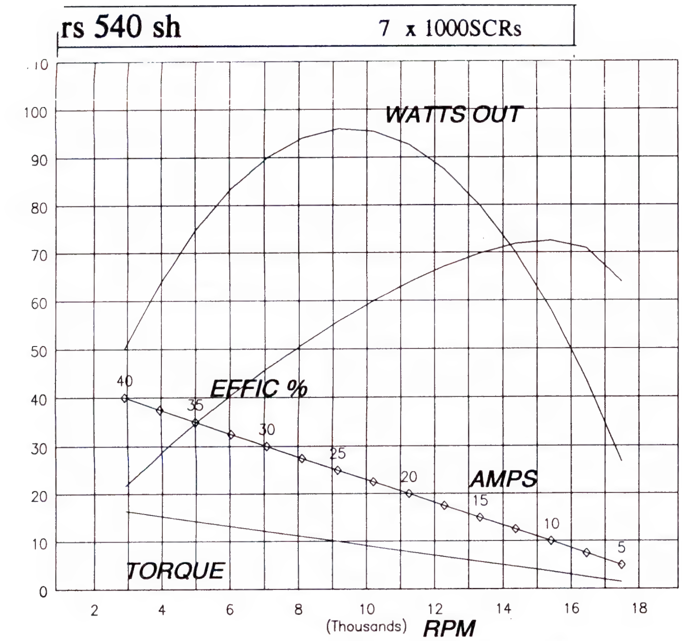
MOTOR:	speed 600 pb 8.4							
date of test		*jan-91*		*P. Stevenson*		7 x 1000SCRs		
AMPS	VOLTS	P IN	P OUT	EFF %	RPM	T N*cm	PROP Dia	PROP Dia
5.0	8.38	41.89	27.00	64.47	14522	1.776	4.8	4.4
7.5	8.19	61.43	43.19	70.30	13549	3.044	5.7	5.2
10.0	8.01	80.05	56.79	70.94	12575	4.313	6.5	5.9
12.5	7.82	97.73	67.80	69.37	11601	5.581	7.2	6.5
15.0	7.63	114.49	76.22	66.57	10627	6.849	7.9	7.2
17.5	7.45	130.31	82.06	62.97	9653	8.118	8.7	7.9
20.0	7.26	145.20	85.31	58.75	8680	9.386	9.5	8.6
22.5	7.07	159.16	85.97	54.02	7706	10.655	10.4	9.4
25.0	6.89	172.19	84.05	48.81	6732	11.923	11.5	10.4
27.5	6.70	184.28	79.54	43.16	5758	13.191	12.7	11.5
30.0	6.52	195.45	72.44	37.06	4785	14.460	14.3	12.9
32.5	6.33	205.68	62.76	30.51	3811	15.728	16.3	14.7
35.0	6.14	214.99	50.49	23.49	2837	16.997	19.3	17.4
37.5	5.96	223.36	35.63	15.95	1863	18.265	24.2	21.9
40.0	5.77	230.80	18.19	7.88	889	19.533	35.7	32.2
						PITCH ins	3	4.5

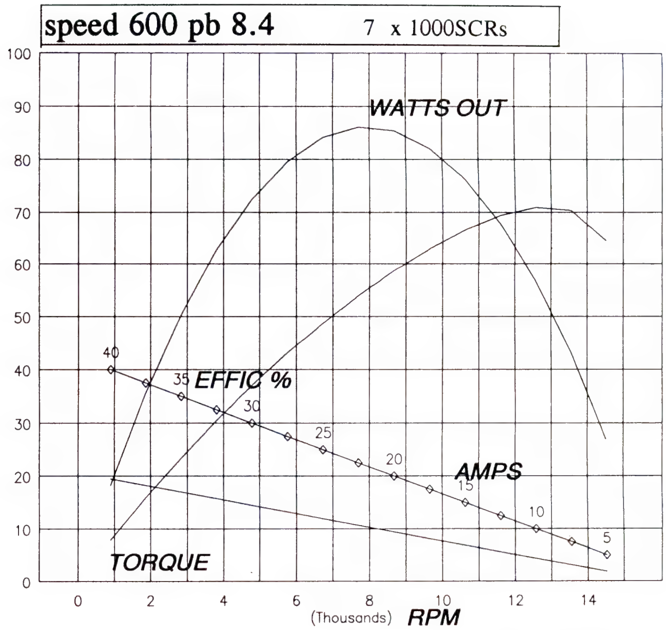


The Stevenson Pitts is another miniature, only 500 mm span and weighing 450 gram. Power is from a geared Biggi motor and 4 Sanyo 450 AR cells. Rx antenna is hidden here, but trails like a glider tug towline in flight. Wing loading is about 7 oz/sq ft; that is 21 gr/sq dm. That is quite an achievement!



Paul Rossiter's P38. An electric Lightning! Modified from a Guillow's kit powered by 2 geared Reno motors and 14 Sanyo 450 AR cells. It will ROG from mown grass at a wing loading of nearly 23 oz/ sq ft, er ... 69 gr/sq dm.





simple motors requires that any runs at this power level be as short as possible, say 15 seconds maximum, or severe damage will result.

In the other 7 cell event, for Pylon Racers, the race duration is now 4 minutes and hence, even with the new 1400 SCR cells, currents are effectively restricted to 20 Amps. At this current level the power and efficiency differences between Neodymium and Ferrite are very small, but because the ferrite offers more rpm it is favoured for racing.

Other Motors

I've included a few other graphs for some other interesting motors which might be useful to some readers in assessing the optimum setup for their motors and their desired use.

The new Astropower Leisure Australia Neodymium motor shows similar performance to my own experimental motors, making that kind of performance now readily available in an Australian made commercial product.

The curves of the Graupner 600 and the Mabuchi 540 SH show that even these inexpensive motors give valuable performance if the currents are kept below 20 Amps or so. This is a direct result of the simple brush design which relies on the spring to conduct the current to the commutator.

The 540 SH, being the nominated Stock motor for Sports Pylon at the National Rally this Easter, will be performing at its best at the 20 Amps required for the event.

SMALL SCALE

I have an absurd fascination with small models, as you will see if the photos of my new 500 mm Pitts Special are printable. Last year at the National Electric Rally the model of the Meeting was won by Paul Rossiter's brand new P38 Lightning. At that stage it was unflown but impressive enough to receive the majority vote.

We received no further news of the model up in Sydney and we feared for the worst, until just recently when Paul wrote to advise of continued flying success. I hope we will see it fly at this year's Rally. Here is Paul's letter, as it contains some good advice for all, and an idea of the forethought required for such a challenging subject.

" The July-August 1991 issue of Airborne included a photograph of my P38 Lightning which won Model of the Meeting at the 1991 Wangaratta National Electric Flight Rally. At that stage the model had not been flown, but it has been since then and I thought you and your readers may be interested to hear about it.

The model was built with great attention to adding both strength and lightness. The weight was carefully monitored at each stage of construction, and all materials chosen accordingly. Main changes to the Guillows kit include: ply main spar re-inforcement out to the nacelles; ⅛ inch square spruce main spars; 1⁄32 inch light balsa sheeting over nacelles and top of fuselage; ply undercarriage mounting plates; built-up tail feathers (as per static display model configuration); maximum material removed from plastic trim items; miniature radio, speed controller (with BEC) and servos; Litespan covering over frame treated with Balsarite; Union Reno Gold motors fixed to ply bulkheads; 14 Sanyo 450 AR cells mounted 7 in each nacelle fixed with Velcro to the landing gear mounts; spinners built up from the plastic moldings provided (ply and balsa sandwich backplates). Control throws are aileron and elevator 7⁄16 inch each way; and the CG as shown on the plan for free flight. This is a real builder's model and took a couple of months to complete.

The model flys very well, as it should since it conforms with the Golden Rules that I use for aircraft of this size and kind:

1. at least 60 Watts per pound of total weight;
2. theoretical propeller speed at least twice the calculated stalling speed (preferably 3 to 4 times for fully aerobatic flight);
3. static thrust at least 1/3 total weight;
4. battery, motors, props and controller combined weights no more than 1/2 total weight;
5. wing loading no more than about 25 to 28 oz per sq ft;

Data for the model are:

current draw 10 Amps;
7,500 rpm on standard Union props (7 x 6?) on fresh charge;
power input 140 Watts total;
weight 32 oz;
wing area 1.4 sq ft;
static thrust 24 oz at start falling to about 19 oz after a couple of minutes;
weight of battery, motors, props, controller, 15.2 oz.

This gives:

70 Watts per pound (rule 1 OK);
calculated stalling speed 18 mph, theoretical prop speed 45 mph (rule 2 OK);
static thrust more than one half total weight (rule 3 OK);

CONTINUED NEXT PAGE

The ND 05 and the ELECTRIC FLASH

When pre-production ND 05 motors were released by Astropower-Leisure Australia (A-L) to several prominent electric flight specialists for their use and evaluation, their responses provided one of the essential early indicators of market expectations for this new range of products. It was clear that the performance characteristics favoured the use of 8 cell battery packs, which are not yet in common use. This required some changes to provide efficient operation with 6 or 7 cells. A-L have now incorporated these changes, and also enhanced the 8 cell model to extend the range for higher powered applications. The following improvements were made:

- Special armature windings;
- Higher durability brushes;
- Front and rear ball bearings;
- Soldered brush connections.

There are now 4 motors in the range:

- 3021, Direct Drive, 6-7 cells, 22 turns;
- 3022, Direct Drive, 8-10 cells, 30 turns;
- 3031, Radial Mount. 2.5:1, 6-7 cells;
- 3041, Long Gearbox, 2.5:1, 6-7 cells.

The Performance Table below is from the new A-L information leaflet, and gives an indication of the extended capabilities now available. A-L claim that the 3021, 3031 and 3041 motors are equivalent to the stock Astro 05, and the 3022 model will match the 05 FAI (with the additional cells, operating at lower currents).

The Pricerite-Astropower ELECTRIC FLASH is one of the few Australian-made kits for electric flight, and since its release in 1987, many variations have been successfully flown. Originally designed for the Astro 15 Super-Ferrite and Cobalt motors, the Flash does not fly to its full potential with less power, and has sometimes disappointed the modeller who fitted an 05 Ferrite power system. A-L advises that if using an 05 Ferrite motor, better results are achieved using lightweight covering material, and flying without the undercarriage. This keeps the flying mass to around 40 ounces.

The A-L prototype has now been tested with the ND 05 motors, and the results are described as very satisfactory. The following systems have been used:

(1) 3021 motor, 7 cells x 1000 SCR battery pack, 7 x 4 inch Tornado prop. Motor control by servo-operated micro-switch and BEC unit. Motor run of 3 to 4 minutes, flight times of 6 to 7 minutes.

Performance is quite strong, although a shallow dive is usually necessary for loops and rolls.

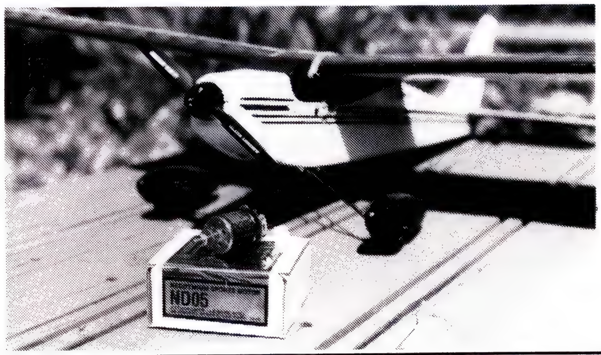
(2) 3022 motor, 8 cells x 1000 SCR battery pack, 8 x 4 inch Master prop. Motor control by servo-operated micro-switch and BEC unit. Motor run of 3 to 4 minutes, flight times of 7 to 8 minutes.

Performance with this system is similar to that with the 15 size motors, with loops from level flight and strong climbing ability.

We can see from this report that preliminary exposure to the end user in the market place has effectively enabled a better product to be achieved. The production ND 05 motors are now available with enhanced performance for use in a wide range of electric flight applications.

PERFORMANCE TABLE

Motor	Battery	Prop	Amps	Thrust	Model Wt.
3021	6 Cells	7 x 4 inch	22	13 to 14 oz	45 oz
		8 x 4 inch	28	16 to 17 oz	48 oz
	7 Cells	7 x 4 inch	29	18 to 19 oz	48 oz
		8 x 4 inch	32	20 to 21 oz	50 oz
3031	6 Cells	12 x 6 inch	18	19 to 20 oz	50 oz
and		13 x 7.5 inch	24	21 to 22 oz	54 oz
3041	7 Cells	11 x 7 inch	22	22 to 23 oz	54 oz
		13 x 7.5 inch	27	26 to 27 oz	58 oz
3022	8 Cells	8 x 4 inch	26	22 to 23 oz	50 oz
		9 x 4 inch	28	25 to 26 oz	54 oz
	10 Cells	7 x 4 inch	24	21 to 22 oz	50 oz
		8 x 4 inch	29	27 to 28 oz	56 oz



FROM PREVIOUS PAGE

weight of battery, motor etc. 0.48 total weight (rule 4 OK);
wing loading 22.8 oz per sq ft (rule 5 OK).

The model accelerates rapidly and takes off from smooth grass without any drama. It looks very realistic in flight and sounds good too, with the whine of the Union gear reduction units not unlike the turbos of the real aircraft! The airframe has proven to be quite strong as I found out once when I tried to slow it down too much on landing - it tip stalled a few feet up but damage was only minor and easily repaired in a few minutes. Flight times are typically around four to five minutes with judicious use of the speed controller, but that is more than enough to get my palms sweaty!

Things that I would change if I did it all again include:

cover LE of inner wing sections with 1/32 inch light sheet to improve torsional rigidity;
incorporate steerable nosewheel (linked to ailerons);
use different covering (the Litespan is indeed light but it is hard to apply and tends to crack if abused, e.g. rough landings);

Paul, with your obvious capabilities, I offer you your next challenge: reduce that wing loading by 25% and your palms will not get so sweaty! Congratulations on a great achievement.

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Free Flight Topics

About two and a half years ago, Stan Hinds presented some interesting results with a high thrust line model he had developed for F1J. This is not a popular class here in Australia, since it is in conflict with, rather than complementing, the traditional ½A power class. However, ½As may be flown in F1J, and the new, larger racing engines like the CS and Shuriken are also for F1J but are too large for ½A.

It seems that there may be two groups flying these two power events for some time to come, but the Hinds design is suitable for both, and the following report from Stan can be applied to both, although it may be more beneficial with the more powerful F1J machine.

UPDATE ON HIGH THRUST LINE

by Stan Hinds

In Airborne No. 92 (page 52) I related why the conventional low thrust line power model does not have stability in pitch when climbing, and I also described a high thrust line (HTL) model which does have this stability, since the TL is above the CG. But the HTL model described was very difficult to launch because of the nose-down moment from the thrust; the conventional layout does not have this problem.

What is needed is a layout similar to the conventional one but with the TL above the CG so as to get pitch stability. This can be done by raising the TL and inverting the engine to keep the CG low. In the F1J shown in the photo the engine also has some down-thrust such that the overall effect is for the TL to pass about 8 mm above the CG. This is not a large nose-down moment (but is still much better than the nose-up moment of the low TL layout), and seems to be stable to my launches; sufficient to win F1J at the Bendigo Nats!

The F1J layout is somewhat similar to the Eureka of N. Marcus (Aeromodeller, Oct. 1958; FZYB 1955-56), but his model has a side mounted engine. This means it is most unlikely that the CG is low enough (if the CG position marked on the plan is to be believed, the CG is **not** low enough), and hence does not have the vital requirement of the TL above the CG.

I haven't had any starting problems with the inverted engine, as I start it sideways with the wings vertical. The fuel pick-up point in the tank is from the rear bottom corner on the side lowest when starting.

This model also requires a lot of right rudder to get a straight climb using VIT, as explained in Airborne No. 92. Hence a very small amount of auto-rudder (about 1 mm) is needed for a glide to the right. This phenomenon could be useful for the SLOP flyer since I think a conventional low pylon layout with an inverted engine on a long nose (with this side area below the TL), if trimmed for a gentle right turn on the climb, would have a natural glide to the right, without a tilting tailplane and so on.

NEW NOISE RULES

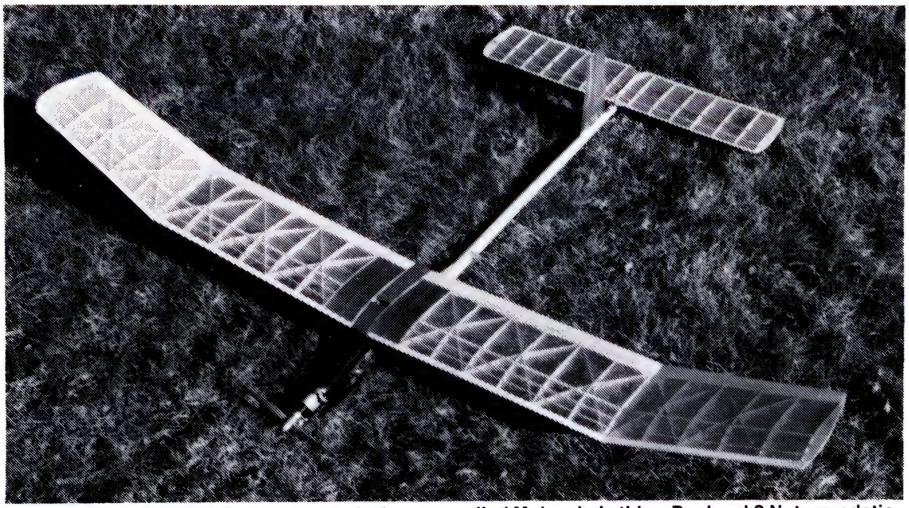
Due to pressure from CIAM, mufflers are now allowed but optional on F1C contest power models. However, if you do not have a muffler you may not be permitted to fly in some contests due to the field being in a noise sensitive area. If you do use a muffler the noise has to come down to 96 dBA at 3 metres. Timing the motor run will not be as easy with less noise, so don't launch while another engine is running.

A different approach to noise control that was suggested was to keep F1C away from the boundary of the field so that the noise level was not more than 6 dBA above the ambient noise level. For our fields in the wide open spaces this is unnecessary, but the proposal was accepted. The rules apply from next year.

NEW FLY-OFF RULE

The times for fly-offs in F1A, B & C have been increased to 2 minute increments. For flyers who max out, times in the fly-off rounds go to 5 minutes, 7 minutes and so on; effective from January 1993. If it is windy, you could lose your model sooner, trying for a longer flight.

To avoid losing the current super models, perhaps we should consider changing to kites when the wind gets above 5 mps! Or should the organisers provide a helicopter rescue service?!



Overall view of the Hinds F1J. Previous design was called Mohawk. Is this a Poohawk? Note geodetic wing structure as recommended in Airborne No. 92.

PACIFIC CHAMPIONSHIPS

Swan Hill, Easter 1992

The organisation was the best yet.

The attendance was the best so far.

The competition standard was very high in spite of bad winds; some rounds had very bad wind. Some thermals took DT'd models about 10 km across the paddocks. The company made up for the conditions, but it is sad that the super performance of today's models can actually be a handicap: they go so far that you need a motorised recovery team to be able to keep flying.

Details will be in FFDU, Flypaper, FFONZ News and the BFFS newsletter, but here are the top scores, thanks to Danny Maslowicz and his PC on the field.

F1A - 28 flyers

Phil Crump	NZ	1238
Peter Nash	Aust	1231
Geoff Higgins	NZ	1195
Vin Morgan	Aust	1190

F1B - 27 flyers

Gary Odgers	Aust	1290 + 240
Richard Blackam	Aust	1290 + 165
George Baynes	Aust	1284
David Ackery	NZ	1223

F1C - 6 flyers

Koei Tsuda	Japan	1258
Dave Thomas	Aust	1240
Jon Fletcher	Aust	1239
Roy Summersby	Aust	906

Australia won all three events in the **Trans Tasman Challenge.** The Kiwis will have the opportunity for revenge in 1994, probably at Rangitaki.

F1G - 6 flyers,
won by Marc Bailey, a junior, with 401.

F1H - 12 flyers,
won by Pieter de Visser with 498.

F1J - 4 flyers,
won by Martin Gregorie (UK) with 495.

Open Power - 2 flyers,
won by Roy Summersby with 540.

Open Rubber - 12 flyers,
won by Jon Fletcher with 465 in the fly-off.

Combined Open - 15 flyers,
won by Jon Fletcher with 100%.

Combined Vintage - 5 flyers,
won by Chris Murphy with 504.

Scramble - 6 flyers,
the Russ Hammond Trophy; won by Ivor F.

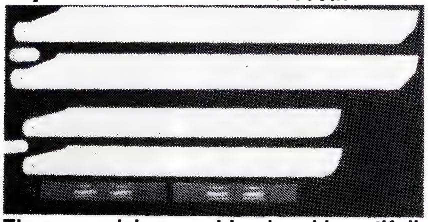
Chuckie - 12 flyers,
won by Phil Crump with 180.

The AFFS Champion for 1992 was Chris Murphy from New Zealand. After being presented with the Airborne Trophy, Chris was almost lost for words!

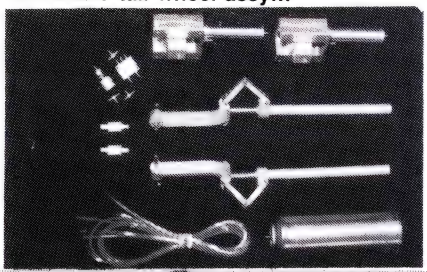
The Presentation Dinner was the best event of the weekend. The meal was the best I have had at such a function, and the company was in a class of its own. The final tribute of the evening was a vote of thanks to Richard Blackam and the VFFS; none more richly deserved.

TRADE NOTES

The latest from Funkey Aeroplane Models are their range of carbon fibre reinforced glass heli blades. Precision balanced and exquisitely finished, in the usual Funkey tradition. These blade sets include spacers, decals and are suitable for .25/.35 as well as .60 size helicopters. Call the Hobby Headquarters on: (02) 545 1944, (02) 545 1090, Fax: (02) 545 1340. or any Hobby Headquarters supplied dealer, for the flight of your life at a reasonable cost!!

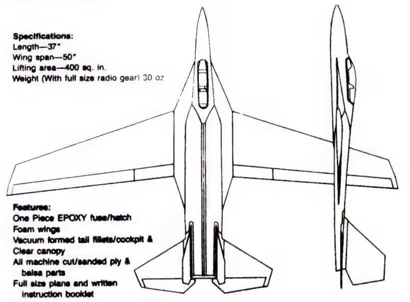


These precision machined and beautifully finished retracts are now availabe to suit to suit the 1/5 Pica P51D Mustang. Full functioning oleos with top quality fittings make these units a logical addition to a fine kit. Call the Hobby Headquarters on: (02) 545 1944, (02) 545 1090, Fax: (02) 545 1340. or any Hobby Headquarters supplied dealer... Similar retracts now in stock to suit the Yellow aircraft MK XIV Spitfire. Includes aluminium spoked wheels. Scale tyres and retractable tail wheel assy!!!



Aluminium adjustable mounts to suit all .40 and all .60 size engines are now available. Suits most engines from .35 to .75 in fact! At very reasonable cost. Available from the Hobby Headquarters Pty Ltd. 14/10 Yalgar Rd, Kirrawee NSW. 2232. Tel: (02) 545 1944, (02) 545 1090, Fax: (02) 545 1340. Also available from any Hobby Headquarters dealer.

The DCU Stryker is a high performance slope soarer with excellent performance in light wind conditions. Using the latest fighter aerodynamic techgnology, results in exceptional speed. Epoxy glass fuse and foam wings, vacuum formed accys and machine cut parts accelerate completion and provide a very robust aircraft. Available from the Hobby Headquarters Pty Ltd. 14/10 Yalgar Rd, Kirrawee NSW. 2232. Tel: (02) 545 1944, (02) 545 1090, Fax: (02) 545 1340. Also available from any Hobby Headquarters dealer.



Kit Review

PRECEDENT ELECTRA FLY

Introduction

This new design is an electric powered glider. It is a very good kit. In fact, it has two features which make it exceptionally good. The first is an electrical harness, motor and folding propeller that are ready to install; only the battery has to be added. The second feature is outstanding wood selection; the best I have encountered. This will vary from kit ot kit but it is more important with the weight and low power of an electric system to keep down the weight of the airframe, and it was obvious that Precedent had made an effort to do this.

It could be regarded as a further bonus that Electra-Fly can be flown with a 2 function radio, since an on-off switch is part of the control system supplied in the kit. It is also larger than most other introductory kits, and that also has advantages of visibility and stability.

The Kit

The kit box is not large. All the materials are well packed. Only adhesive and covering are not supplied. Any radio may be used, as standard sized servos are easily accommodated.

The plan is excellent. The assembly instructions are excellent. However, parts are numbered, not named, and it takes a little time to become accustomed to reading "glue part 1001 to part 2001", identifying the pieces from the diagrams, only to realise it is saying 'glue the rib to the trailing edge' (or whatever). If this slows down construction it also ensures that no mistake can be made. There is also a set of assembly diagrams that match the plan and written instructions. This is the best set of cross-referenced instructions I have used. However, the aircraft is so simple that the instructions were hardly necessary. The parts fitted together so well that the Electra-Fly would be as good a beginner's kit as could be expected.

Furthermore, the instructions included set-up notes for the SLEC 540 motor control system; there seemed to be nothing that Precedent had not provided for in this kit. SLEC has a full list of replacement parts which are available from Dawn Trading.

Construction

Building the Electra Fly showed just what kit manufacture is all about: it was so easy that there is nothing that deserves special comment. The die-cutting was good; the ribs separated from their sheets unaided. The fuselage sides were quite soft and the edges were not as clean, but when glued together to make the box of the fuselage, and the corners rounded, the slight blemish had been eliminaed. The slots for the ribs in the wing TE and LE were too large, but caused no problem; spar slots were a snug fit. Using the ribs untrimmed, as described, added slightly to the wing chord; again, no hassle.

A sanding block was hardly needed to get parts to fit until the shaping of the wing tips, leading edges and fuselage nose. However, the wing trailing edges were considered to be a bit too thick and were trimmed to give a better wing section.

Covering

Fibafilm can be used to good advantage on the wings, the application of the Balsaloc needing a little care, the result well worth the effort. The technique is fully described in notes supplied with each roll of film. The fuselage was doped and tissued and coloured with Solarlac, although the extra weight of such a finish may be avoided with an electric powered model since no fuel proofing is required.

Controls

The radio control and electric control components are all provided for in the design of the Electra-Fly and, in a word, simply dropped into place. This was quite a relief after experiences with some other kits. With everything set up, careful checks must be done. An electric motor can start without the intention, just by getting the switches out of sequence. The checks and safeguards are fully described in the instructions.

Flying

The instructions, again, are very explicit. With a large wing having plenty of polyhedral, and small tail surfaces, the Electra Fly is stable and responds slowly to control commands. This is all the model needs. The rigging angles are correct, the balance point may be varied a little; the model flys superbly. After two hand glides to check the trim, power was used to get to a good altitude where lift was found, to give a first flight of a quarter of an hour. No trim adjustment was needed. Provided that the flying surfaces are kept flat during construction and covering, the Electra Fly is an ideal introduction to electric powered flight.

There were several good points about the Electra Fly that deserve to be mentioned. The first was the good fit of the parts. It is so much better when assembling a model not to have to trim the parts with a sandpaper block to get them to fit. In this case the only trimming chore was to the spar ends on the wing panels, the cross-grained sheeting on the fuselage and the wing tip and nose blocks. The nose block had the aperture for the electric motor and the down-thrust already done, speeding assembly quite a bit.

The electric power harness had a Mole[x] connector for the battery, and this may need t[o] be changed if you do not have a Molex on you[r] power pack. The warning about the electri[c] motor starting unexpectedly was easily take[n] care of with the fuse mounted in the side of th[e] fuselage. I was soon into the habit of not puttin[g] in the fuse until I was about to fly.

The Electra Fly wing has one wire joiner, s[o] to prevent the wing halves from rotating on th[e] wire and becoming misaligned I taped aroun[d] the wing root ribs.

Flying was a pleasure. Admittedly the weath[er] for the initial flights was warm and calm, but t[o] be able to switch the motor on and off demon[-] strated the greatest advantage of electric powe[r]. The Electra Fly would get to about 300 feet i[n] less than a minute, leaving another 2 minute[s] of motor run to be used later to regain height an[d] continue exploring the sky for lift. The mode[l] thermals very well and needed a bit of u[p] elevator trim for the glide.

Remember not to switch on the motor whe[n] down low at some distance from the transmitte[r] because the burst of electrical activity when th[e] motor starts could swamp the receiver and pu[t] an end to a great model.

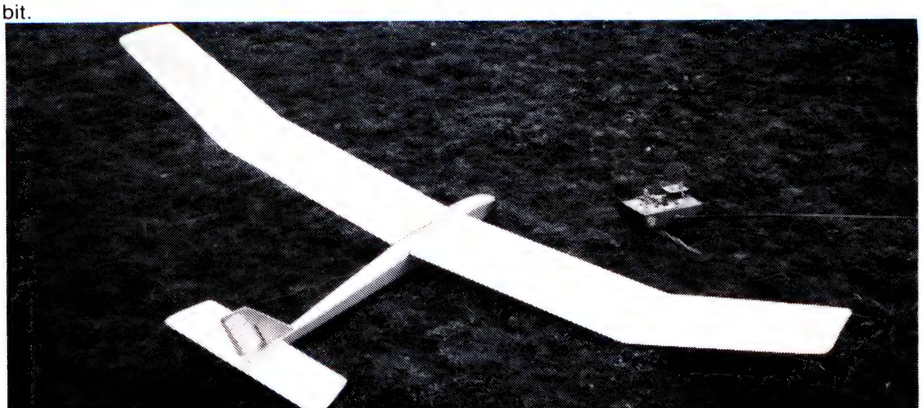
Conclusion

I found nothing in this kit to criticise. I mad[e] one change only, using cables instead of th[e] pushrod for the rudder. The only niggle i[s] removing the battery for recharging, but safet[y] comes first. The flying is assured.

SPECIFICATIONS

Wing Span:	**2.17 metres**
Length:	**1.07 metres**
Mass:	**1.12 kg**
Wing Loading:	**22 gr per sq dm**
Functions:	**Rudder, Elevator and On-Off micro switch**

The Precedent Elctra Fly is imported an[d] distributed by Dawn Trading, 17 Tenterden Rd, Botany, 2019. Ask about Electra Fly at you[r] local hobby shop.



All that you need to go flying. A Precedent Electra Fly and the radio transmitter. Take a good stop watch too; flights can be quite long with multiple motor runs to search for lift.

For Old Timer Sake

SOMETHING SPECIAL THIS WAY COMES

As Colin B. has been unable to catch a suitable thermal and soar to the aid of this issue, the invitation that I sent out at the beginning of the year for contributions about contests, models and comments still stands. So far the response has provided the mixture which follows. There is far more to Old Timers than the rules (w)rangle that has stifled the subject as a result of comments in recent issues. FOTS is part of the fun of aeromodelling, and your news is needed to add to the fun. Send it to me at RMB 1798, Benalla, Vic., 3673, or to John Quigley at PO Box B79, Boronia Park, NSW, 2111.

And now over to the B, F and Q show .....

RUNNING AND CARING FOR THOSE OLD SPARKIES

by Norm Bell

Ray Halstead with Record Hound, designed by Henry Struck. Has a Saito 4-stroke, giving a skyrocket climb, and glide is superb. Monowheel and anhedralled tailplane make take-off and landing interesting. Bell photo.

It would appear that anyone who messes around with model ignition motors must have a liking for self punishment. Without doubt, when Murphy's Law was invented it related directly to those exasperating, mystifying little Sparkies.

Some fifty years after owning and running my first ignition motor I still find it astonishing that they run so well. And when everything is just right they **do** run well , and they can be very reliable. In fact, I enjoy running them so much that I think it is reasonable to suggest that after you have shown the troops how clever you are to get it going at all, don't bother flying your model, just whack it back in the car. You've had a great day and you are well ahead 'cos you haven't bent your model!

Okay, if you want to experience the nostalgia and delight of running a Sparky reliably, here are a few generalities and case histories.

Firstly, take nothing for granted. Murphy is hiding everywhere and waiting to pounce. Keep all circuiut wires as short as possible and use heavy grade, multi-strand hook-up wire. Use one of the modern condensorless transistor ignition systems, such as Joe Klaus' Custom Craft system. This particular system is excellent. These systems have the great advantage of using low current across the make and break points, so burning and arcing at this area are things of the past. If on your ignition system you are using two nicads with a nominal voltage of 2.4 and are having problems, add another cell to give 3.6 nominal voltage and I will guarantee that 70% of your problems will disappear.

A Herb Wahl Brown Junior in Norm Bell's Westerner. Plenty of power and good economy for Texaco flying. Would Joe Weathers have approved of the APC propeller?

Never use spring loaded battery boxes; they give nothing but trouble. The spring connectors play up under vibration. Use soldered connections on everything.

I use nicads directly wired into the circuiut via a screwed junction box with charging terminals attached. This way the batteries can be removed if necessary, but they generally stay put in the model.

The fuel that you use is important.Unleaded petrol mixes well with castor oil. Castor will give less trouble with fouled spark plug points than mineral oil, and the castor is a super, proven lubricant and heat remover. Methanol and castor are suitable for most spark ignition motors, but can give difficult starting in cold weather. Never put methanol in one of the old plastic tanks in those ancient Sparkies; the tank will just melt. Petrol and castor is quite OK.

I use 3:1 Shell unleaded and Castrol M pretty well universally now in all my spark motors.

So much for generalities; now a few case histories.

Case History One

An American friend, Howard Osequeda, sent me a new Herb Wahl Bunch Tiger. This was one beautiful motor and I could hardly wait to get it into the test stand. Well, two hours later I was wondering what I had done to deserve this punishment. My arm was sore, my wrist was sore and my flicking finger was sorest of all. That little beast of a jewel simply would not start.

I dismantled the needle valve and the point assembly. No way such a beautifully made motor would not run. I was missing something, but what?

I checked the whole ignition system. It ran an Ohlsson 60 perfectly. What then?

I unscrewed the brand new Herb Wahl Bunch plug, and it sparked perfectly every time.

That evening I thought about the problem carefully. The next day I fitted a new Champion spark plug that had been hidden away for just such an occasion as this. Choke twice, ignition on, flick once, and that Bunch is spinning like a turbine; not a miss, smooth as silk and running like Herb Wahl wanted and meant it to.

That original new spark plug was sparking perfectly out of the motor but was failing under compression. Just to prove the point beyond doubt, I tried it in the Bunch again and, sure enough, no joy.

The lesson is that you have to double check everything.

Case History Two

I received a new Ohlsson 60 Gold Seal side port. It ran fairly well but seemed to have a persistent misfiring and was very difficult to start. I was beginning to suspect the ignition rig in the model, so a Super Cyclone was transplanted in place of the Gold Seal. That motor ran perfectly; not a sign of misfiring, and instant starting.

Something was wrong with that Ohlsson, but what? I put the motor into the test rig and ran all the usual checks. Everything was OK, but the actual spark across the plug points seemed weak. But only on the Ohlsson; other motors were fine.

Suddenly it clicked. That Herb Wahl Ohlsson had a beautiful anodised crankcase, and I well remembered from my working days that anodised aluminium is a poor conductor of electricity. Solution? File the crankcase slightly to remove the anodised coating from under the earth connection, and instant success; a spark like the SEC would provide, and a perfect starting and running Ohlsson.

Case History Three

This particular problem was the most baffling and, to be honest, it was by pure accident that

the solution was discovered. My original 1948 Anderson Spitfire, previously owned by John Pond, had done a whole lot of running by John, and also I had put in quite a few hours in my Quaker Flash. Despite all this, the motor was immaculate and unspoiled in every respect. It showed no signs of wear, started instantly and ran vociferously every time. Recently, however, the Anderson had become cranky; inclined to bite and generally fussy to start and run. It flooded easily and tended to misfire - the reversal of its previous good behaviour.

I tried all the usual fixes such as changing batteries and plugs, and cleaning points. All to no avail. I took that motor out of the Quaker and put in a front rotary valve Ohlsson 60. This went like mad, so obviously the problem was not in the ignition set-up. I replaced the Anderson and still the same problems occurred.

By this time I was examining the timing points closely, but they were clean and had the correct .010 inch gap. When testing for spark I generally short the tungsten make and break points with an insulated screw driver. It saves turning the prop and gives you a better idea of the spark intensity. The spark was certainly weak and nowhere near as hot as it should have been.

Purely by accident I advanced the timer mechanism, and lo, a big, healthy blue, high tension spark! Eureka; problem solved! With this engine the entire spark advance mechanism is a friction fit on the crankcase front housing. Over the 45 years since the motor was born this fit had become loose and also soaked in oil, which was preventing proper grounding of the circuit. I cleaned the timer friction fit area, tightened the timer friction fit on its bearing and all problems disappeared. Simple, but what a drama to find!

When Ray Arden invented the Glo Plug back in the '40s, hundreds of thousands of modellers must have breathed a sigh of relief. Of course, in those days we had real problems: batteries were poor quality, no such thing as nicads and no transistor ignition systems.

Today we have lots of advantages amd better knowledge of things. Many modellers still love the old Sparkies. They originated in the Golden Age of Model Aviation, and it's a wonderful bonus to think that we can still use them and enjoy them in this modern age.

OK. So Sparkies are fun! They don't have mufflers; does that add to the fun? Even so, the exhaust noise will damage your hearing. Wear ear muffs; you deserve no less.

A POINT OF VIEW

Tempered a little by the passing of time

by Ivor F

Merv's 1991 Aeromodelling Digest had an article by my good frend in modelling, Norm Bell. Norm's article began with a mechanophile's wearing of heart on sleeve: ''My love affair with engines ....''

I'd never considered my relationship with the beasts a love affair - a love-hate relationship, yes; an affair - no way!

Like Norm, as an impecunious brat, the idea of ever owning one was preposterous. The Brown Junior, in its cheapest version, was variously enywhere from £8/12/6 to £9/19/6. By the time I'd got my first job at 15/- for a 44 hour week, it was alredy 1940 and there were no more motors available, even had I been prepared to spend 12 weeks' wages on one; - call it over $1400 for to-day's apprentice getting $120 per week. A little earlier my Dad had given up working for a boss and had gone into business as an electical contractor. For the first year he did it all on a push bike, with the 12 foot (call it 3½ metre) lengths of conduit tied to the cross bar. A trial run with a sixty pound sack of tools and fittings, and the sed conduit aboards, convinced him of two things. The first was that he'd have to saw the conduit into six-foot lengths if he wanted to negotiate the first corner. The second was to save his money for a car. It was a 1926 (only 11 years old) Fiat Tourer with magneto ignition. Price - £19; less than the price of two Brown Juniors, which will convey some idea of what the relative cost of things was.

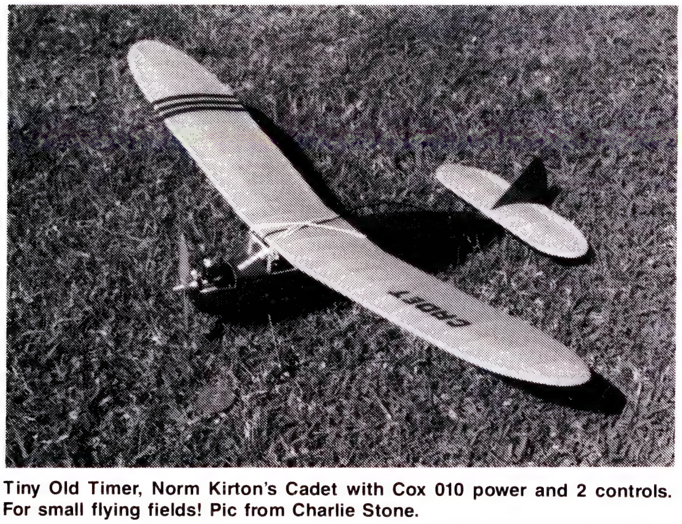
By the time I'd joined the army and survived 3½ years it was 1947 and the diesel had arrived, and who was going to bother with one of those old spark ignition things out of Noah's ark? You couldn't give them away. Ohlsson just had to convert their production to the US version of the new battery-less system and, of course, disaster. Europe went for the diesel. The good old Hew Hess Hay went hook line and sinker for a 1911 German discovery revived by Ray Arden. Yeah mate, it's called a glo-plug.

Disaster? Get yourself an invite to enybody who owns an Ohlsson. Norm Bell and Leo O'Reilly need gingering up. Make sure Leo or Norm shows you that lovable .29 featured in Norm's epithalamium. You will have alredy noted that Norm got himself a divorce from this particular old flame because he found out she had henna'd hair and couldn't cook (with gas). The other thing he didn't tell you (always a gentleman) was that she was held together by two rather minimal spot-welds. When the O & R factory switched to glo, the increased BTUs (whatever they are in metrics) were just too much for the spot-welds to handle. A large percentage of the O & R production engines (once installed, took off at a 3 inch height from bearer to cylinder hed and glided back down with an occasional popping, a virtually free-wheeling propeller, and a new height of 3½ inches. Surprize! Surprize!

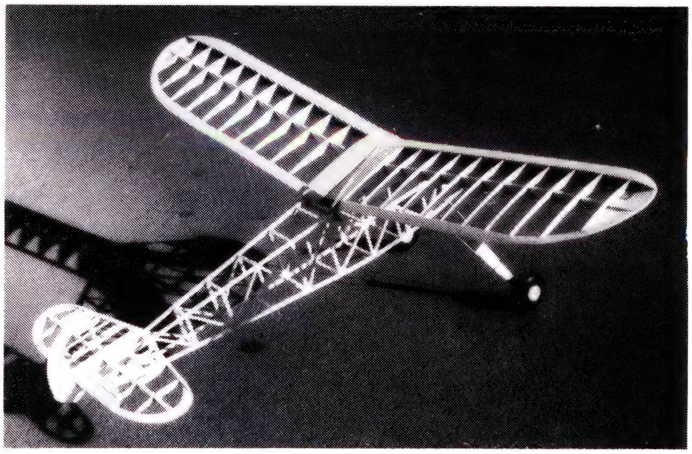
Those modellers blessed with the long-range vision of Cortez with eagle gaze upon the Pacific, no Keats got it wrong, it was Balboa, saw what Cortez (or Balboa) were never privileged to see: the once and once only in a lifetime vision of a genuine reciprocating i.c. engine. What vision? Why, not only the piston, gudgeon pin (wrist-pin if you insist) and rod going up and down, but joy oh rapture, the glo-plug, cylinder hed and cylinder all matching oscillations with them; a totally O & R concept of 'reciprocating parts'. As far as history records, if the now impoverished owner didn't glimpse this phenomenon right there and then in those last few seconds of descent, he never got to see it.

Now here's an entreprenneurial idea. Why not buy Norm's or Leo's Ohlsson for $300? Who knows; you might get it for even less. Then you sell $20 tickets for the privilege of watching this once-in-a-lifetime-of-eny-engine spectacular. Goodness Gracious me, as Joh used to exclaim between mouthfuls of pumpkin scones, you need sell only fifteen tickets to break square. You might sell a thousand! Not only could you make s profit of $19,700, you could get an Australian Award. After all, others have, one or two, for somewhat less perhaps.

The Aeromodelling Digests have many more historical articles; and many up-to-date ones, too.



Tiny Old Timer, Norm Kirton's Cadet with Cox 010 power and 2 controls. For small flying fields! Pic from Charlie Stone.



Framework of the Gas Buggy, an Airsail kit. Let's see more photos like this; before the craft is hidden by the covering. Those tiny elevators and rudder would not suit me. Has anyone tried such a system?

ALL OLD TIMER STUFF

by John Quigley

NEW EVENTS

Fox Contest

The members of the REMAC club in Sydney, who fly at Christie Park, North Ryde, on Sunday afternoons from 12 noon till about 5 pm, are mad about Fox engines and vintage stuff. Bob Burrell, the keeper of the signs, thought it would be a good idea if a, dare I use the term, 'Annual Contest' for Fox engines be held to keep alive their sentiment for this marque.

The club committee, not wanting to cause any infringements with the Fox manufacturers, wrote to the factory asking for permission to use the name and run an Annual Memorial Contest. The response was quite overwhelming: they gave their unequivocal support and sent a specially fitted engine as a prize.

John Quigley, who can, and the Kandoo that can't. Story in this column.

REMAC offers considerable support to sport flyers and juniors, therefore, knowing that an engine like this may bring out the true-blooded competitor, the club has decided to carefully mount this engine on a specially built plaque. This will be held by the club as a perpetual trophy, thereby preventing the inadvertant loss of this engine. This perpetual trophy will be suitably engraved, and the winning contestant will receive a different trophy also suitably engraved to mark the occasion.

It will be a contest for any American design kitted or published in a magazine on or before Dec 31st, 1955, powered by any Fox 35. There will be NO bonus points for age of engine. This is to prevent a privilaged few who may have a sandcast, two-bolt marque from having an advantage. So, the latest version Fox will not be a handicap. No doubt, if an old version Fox is used it will attract some attention from other contestants and onlookers, but it will provide no contest advantage.

The flying will be to the Old Timer Stunt schedule, as used by NSW.

The venue will be Christie Park at North Ryde, and the time will be early October, 1992. The exact date has not been settled yet, but it will not be the long weekend. Watch this column, the CLAS newsletter, or ring Bob Burrell on (02) 419 4201.

On May 3, 1992, at St. Ives showground, Sydney, CHM will be conducting a **Vintage Combat Day.** For more information contact Dennis Percival on (02) 871 1558.

REMAC also hold **Vintage Rallies** four times a year. At these events all and sundry are encouraged to come along and fly their OT models or run their old engines. Bring your old sparkies; many admirers would love to hear them run. The next meeting is scheduled for May 31st. 1992, at Christie Park.

PLEASE CONSIDER

It is a long time before the Queensland Nats, and I and others would like the Qld. and future Nats Committees to consider the plight of those of us who are interested mainly in Old Timers. Many of us would like to compete in or watch two or even all three of the facets of OT modelling. Please consider this when scheduling the events at the Nats so that, hopefully, there will be a reduction on the number of clashes of OT events. You will probably get more entries, which can only be a good thing for all concerned.

PHOTO CALL

The photo of me in this issue was taken by Bob Burrell last winter at Christie Park. I took off my sunglasses but forgot to remove my hat. When taking a snap, please ask the subjects to remove their hats, or ensure that the faces are not shaded. Many otherwise good photos reproduced in magazines have black blobs for the faces and readers can't get to know what the modellers look like. *Use flash instead: even in daylight. And set the lens to close-up range.*

Who built the model? Those old free flighters may not believe this, but it was constructed by Basil Healy for the CL rally at the 1991 SAM Australia Champs. He used a piece of ¼ inch ply for the fuselage but cut a BIG hole in the rear end and covered it with tissue. I had a spare OS 10 FSR, wheels, lines and so on to finish it off and embarrass his FF image. The model needs an Enya 11, or preferably a 15. Not that there is anything wrong with the OS. It is just that the nose is so short that the model is still tail heavy and the extra power and weight of a 15 would pull the model nicely. The bandage on the tip holds the tip weight; several ounces! During the Champs the plasticine that was stuck to the tip kept falling off, producing a sudden change in flying characteristics!

How does it fly? Blinkin' awful. I can fly it inverted and do lazy 8s, but! Every CL modeller should build one of these old stunt models to appreciate how quickly designs improved in the following years. Now the Veco Chief, Aldrich's Nobler and Weaver's Calamity Jane; they are a different kettle of fish, for some other time.

What is it? Now that's a misnomer; it's a Kandoo - rooly trooly!

MEMBER OF THE FEDERATION AERONAUTIQUE INTERNATIONALE
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MAAA NEWS

MODEL AERONAUTICAL ASSOCIATION OF AUSTRALIA INCORPORATED

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Technical Secretary: Ron Ericson
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MAAA Fax No: (03) 740 9585

Affiliations

As at March 13th, affiliations for 1991-92 by State and Territory were: MAAQ, 1349; RCAS[NSW], 2427; NSWFFS, 66; CLAS[NSW], 113; ACTAA, 171; VMAA, 2481; TMAA, 175; SAAA, 634; AWA, 632; and NTMAA, 121; for a total of 8169. Despite the membership year being from July 1st to June 30th, many of the recent affiliations have been renewals of 1990/91 membership. A 1990/91 affiliation ended on June 30th 1991, and that for 1991/92 does not become effective until the club secretary received the fee. Anyone flying after the end of June and who had not paid his fee did not have insurance cover. Most clubs do not require the payment of another joining fee if fees are paid before the end of July, but no-one should fly until his fees are paid. The same principle applies to other forms of insurance; there is a period of grace for late payment but no cover until the premium is paid. Ideally, your club should collect fees before June 30th.

Anyone joining as new or whose membership has lapsed for more than five years, and who joins after April 1st gains membership until June 30th the following year by paying the fee for the coming year. There are three main classes of membership: Senior, Junior and Pensioner. A junior is defined as someone who turns eighteen during the year of membership and, of course, those younger. A pensioner is someone who possesses a full medical concession card. Anyone else is a senior. Other pensions, such as a DFRDB pension, do not qualify the holder for pensioner membership. Direct affiliation is not possible under the Rules and By-Laws; to become a member it is necessary to join an affiliated club, which need not be in the State of residence.

Public Liability Insurance cover of $5M becomes effective immediately the club secretary receives the fee, although it is expected that the membership record form MR1 will be forwarded, via the State Association, as soon as possible. During March I processed an MR1 dated August. Only one person was listed but, as far as I knew, he was not a financial member and, had he been involved in an accident, I would have had to have queried the State Secretary and the club. I know that the job of club secretary is thankless and that usually work is allowed to pile up until it just either has to be dome or is 'lost'. The answer, I found, was to spend the necessary time each evening before going into the workshop.

There is a $250.00 excess on property damage but not on injury.

Insurance 1

I wrote in the last issue of damage to a caravan. The cost of repair was over $3,000. The owner, as was his right and as the Underwriter agreed, insisted that the caravan be repaired to return it to original standard. The flyer has saved enough with this one claim to pay his MAAA membership fees for well over 100 years!

In the time since I wrote the last column, an RC Pylon competitor has been struck by another competitor's model hit by a wind gust during take-off. He suffered only cuts and bruising and a claim is unlikely, but at least the incident has been reported.

Insurance 2

I have written several times that the Underwriter requires that he be notified of any incident likely to give rise to a claim. Some weeks ago I had a telephone call from an insurance broker for the owner of a (full-size) power boat. It seems that his client, while towing a water-skier, hit and sank a model RC helicopter that had just alighted (I cannot say landed) on a popular lake. The model flyer claimed for the loss of his helicopter from the boat owner, but he failed to report the incident to me as he should have done; it is possible that the power boat owner could claim for damage to his boat. I repeat, the Underwriter requires to be notified of any incident likely to give rise to a claim. I should record that I assured the broker that the model flyer was breaking no law in operating his model on the lake. I also wrote to the member concerned asking him to complete an incident advice form.

Big Cessna Twin by Graeme Smith and John Edmunds of Narrabri. Details were featured several issues ago when it was under construction. A model with a great presence.

Insurance 3

Through the efforts of Cec Bardell, the Underwriter has reviewed the interpretation of the policy after an incident at a club fly-in last year. You may remember that a model, while making its landing approach, crashed into the pits and badly damaged an RC helicopter. The Underwriter will now consider claims for damage to models standing in the pits and not being operated. I believe that Cec pointed out that, had the model been damaged while stored in a parked car, it would have been covered.

Insurance 4

In extending cover for another year, the Underwriter has asked that the Association recommend that you adopt measures which may reduce his risk. Two measures which he believes may do that are periodic testing of your RC equipment and the use of an effective frequency control system. The MAAA has so recommended for 10 years. The measures are not compulsory but, from my observations, they are worth adopting. The best system of frequency control is the Silvertone Keyboard devised by Bob Young more than 20 years ago.

Insurance 5

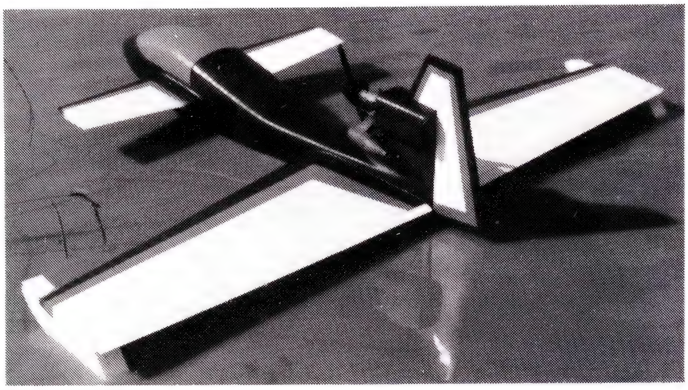
The existing insurance policy is based on that negotiated by the MAAQ with the Underwriter back around 1973 (I think). The Underwriter now would like to build a better base on which to estimate his risk. He has therefore asked that he be allowed to contact clubs direct to have a questionnaire answered. I have not seen the intended questions but I believe that you might, for example, be asked how often you fly and for how many sessions a day. Please do not view the questionnaire as having a sinister intent. The Underwriter reduced the premium (slightly) again this year. He has also agreed to provide $1,000 sponsorship for National Championships and $100 to members of Australian World Champs teams (up to $1,000 per year).

Safety

While there was never a direct prohibition, the wearing of finger rings by RAAF technical tradesmen was discouraged. During my thirty years in the service, I heard of two incidents of injuries to ring fingers when their owners caught the ring they were wearing on a work stand. One other worker managed to short out a battery between a terminal and a lead. I must now report that one of our members earned himself eight hours worth of micro-surgery when his ring finger caught on a pylon cage he was erecting and he has now been off work for five weeks (to date). Please, if you must wear a finger ring, cut the band so that only a thin section has to break. The victim offered to supply a photograph of the injured digit for publication, but this is a family magazine so I did not accept it. His advice is not to let it happen to you.

RC Matters

I am told that some brands of RC receivers, originally intended to operate on 4 dry cells



Southern Belle, a futuristic-looking seaplane by Graeme Frauenfelder of Albury. Engine is an Enya 40 CX and the radio is Futaba 8AP. This canard layout has inspired other similar designs.

World Records

During the European summer last year, records as follows were set:

Class					
32a	F1D	32 min 9 sec	Randolph	USA	3 May 91
32b		35 min 43 sec	Ree	Hungary	30 June 91
33	F3B	239 kph	Kowalski	FRG	20 July 91
55	F3B	118.48 kph	Ischenko	USSR	16 June 91
66	F3Ep	135 km	Aghem	Italy	19 June 91
69		240 km	Hackstein	FRG	22 June 91
65		9 hr 47 min 51 sec	Hackstein	FRG	22 June 91
95	F3E	15 hr 36 min 55 sec	Schaper	FRG	22 June 91
96		490 km	Schaper	FRG	22 June 91
78		109 km	Aghem	Italy	19 June 91
71	F3Es	10 hr 43 min 51 sec	Schiltnecht	Sw	10 July 91
Space 26		22 min 4 sec	Malczyyk	Poland	3 May 91

(6 volts max), lack range when operated on 4 Nicads (4.8 volts max). It seems that operation is satisfactory for the first one or two flights but the voltage then drops below the receiver threshold. The cure is to fit 5 Nicads, but the matter is not straightforward. A columnist in a US magazine warned that doing so brings Ohms law into effect: 20% more voltage across virtually the same resistance gives an increase in current resulting in a reductiion in discharge time. You cannot fly for as long (although if previously your second flight resulted in a crash, you must be ahead). A second consequence of adding the extra cell is either the need for a longer charging time or even a new charger if your existing charger cannot handle five cells. My use of 4 Nicads instead of 4 dry cells might explain the problem I had with an Orbit reed receiver in the early 1960s. It consistently went out of range. Several technicians to whom I submitted it could find no problem. I still have the receiver but I doubt if I will try to confirm the theory.

1992 Competition Rules Conference

This was held on February 8th. The Minutes have been widely distributed. I cannot give details of the changes in this column because of lack of space, but changes have been made to Free Flight Peanut Scale, Vintage and Scale, to several Control Line racing and speed classes, and to Radio Control Helicopter, Old Timer and Scale, while a new class for Thermal Scale Gliders has been introduced. Questions on Free Flight P30 rules and RC Pylon were referred to sub-committees.

Rule Book Format

Ron Ericson, our Technical Secretary, proposed to the Council a change in the format of the Rule Book. I should point out that the CIAM will re-issue Sections 4 and 4A of the Sporting Code early in 1993, so next year will be an opportune time to start from scratch with the MAAA Rule Book. Over the last six years five changes were issued to the Rule Book, prepared variously in set type, by type-writer and word-processer, and printed by four different printers, all for the sake of cost reduction. This shows, and a new start is required.

Back to the Technical Secretary's proposal. Instead of having to buy the complete book, it is intended that you will be able to specify an interest, say Free Flight. For this, you will be supplied, at a lesser cost with a general section plus the CIAM and Australian official and provisional rules for Free Flight events. Administration of the scheme will be more complicated but within the capabilities of a computer. The problem is what to do this year; please let me know if you want your soon-to-be-superseded Rule Book updated this year. (Most of the information is on the computer in a form ready to send to the printer - as I write the exceptions are some decisions of the just-completed rules conference and changes to be decided at the still-forthcoming CIAM meeting.)

Happening Overseas

Those of you who read magazines from the UK and the USA will have noted the formation of rival organisations to the existing national bodies: the Model Pilots' Association (MPA) offers much the same service to UK modellers as does the British Model Flying Association (BMFA), while in the USA the Sport Fliers Association (SFA) challenges the Academy of Model Aeronautics (AMA). Both of the new groups claim to have no interest in international competition and hence will not seek affiliation, through the National Aero Club, with the FAI. The MPA is apparently supported by the publishers of a group of magazines which includes four model aircraft titles. I do not know why it was formed; the BMFA is run as efficiently as possible when the wishes of some 28,000 modellers have to be considered. A cynic of my acquaintance commented that it is probably intended to tap the last hobby dollar; seminars, holidays and so on are offered. The SFA is backed by an insurance group (GAINSCO) which unsuccessfully quoted to cover AMA members some two or three years ago. It is true that the AMA has made some controversial decisions, mainly on the purchase of a central flying field at Muncie, and also on insurance. Until it was forced by member reaction to reverse its decision, it withdrew member-to-member cover although undertaking to pay medical costs. It seems that one family member sued another for a huge sum for pain and suffering resulting from a minor accident. The AMA has since required anyone applying for membership to sign an undertaking not to sue the AMA for negligence. The whole reason for the SFA appears to be concerns about AMA insurance cover arising from these and other actions.

The MPA offers insurance, seminars and aeromodelling holidays. The SFA has insurance, discount travel and zero claim incentives. The latter will not offer cover to CL flyers because, it is said, CL has a history of giving rise to claims. The AMA will have to continue to cover this 'high risk' group with fewer members and hence reduced income. A fee increase for those who stay loyal is highly likely.

The important consequence of these two organisations undoubtedly taking members from the existing associations will be a 'flow-on' effect on international aeromodelling. The FAI depends on membership fees: part of your fee that is paid to ASAC[Inc] goes to the FAI. The matter was discussed fully at the recent MAAA Council conference, including the possibility of a rival organisation to the MAAA being formed in Australia. One significant point raised was whether any rival could provide equivalent service at less cost, although it was admitted that such an organisation would benefit, without cost to itself, from the MAAA's continuing negotiations with the Department of Transport and Communications, and the Civil Aviation Authority. The answer was seen to be better communications between all levels. This column is one method of one-way communication.

The Council also expressed concern that you, the average member, do not know how your fee is spent. The information has always been available in the Minutes of the Council meetings, but there have been few requests for those over the years. (Last year two requests were received.) In setting the fee the Council has all relevant details that I can provide. For example, last year, with our nearly 8,000 members and because of the number of juniors and pensioners, the fee structure of $24.00 per senior and $15.00 per junior and pensioner, resulted in an average fee paid of $22.33. From that, $5.10 paid for your insurance cover, my honoratium took $2.73, membership if ASAC[Inc] was $2.00, and the Council conference $1.17. Attendance at the CIAM meeting cost $0.69. Some other expenses were: postage and freight $0.41, telephone and fax $0.20, photocopying $0.34, stationery $0.15, typing $0.08. If you add the figures up the total does not come to $22.00, but I have not listed all of the expenditure.

1992-93 Fees

The Council decided at the 1992 conference to increase the fee for seniors by $1.00 to $25.00 for 1992-93, but did not change the junior and pensioner fee of $15.00. It also increased my honorarium. For interest, the AMA fee is about A$53.00 at the current exchange rate, but that includes a magazine subscription (about $29.00 without); the SFA is about $33.00 for $1M insurance cover, the MPA about A$37.00, while the BMFA does not show its fee in its advertisements. Membership of the Canadian association costs Can$42.80, again with a magazine. To be fair, these bodies do not have the same type of constitution as the MAAA[Inc] has, in that a member joins directly and not through a club, although most US and UK clubs require that their members be a member of one of the

associatiions. The state fees should be added to the MAAA fee to get a true comparison. Writing as your Treasurer, I do not see how expenditure could be much reduced without reducing service.

History of Aeromodelling in Australia

The Council also decided to form a bureau for the conservation of material important to the history of aeromodelling in Australia. Joe McGuffin of PO Box 286, Engadine, NSW, 2232 is the Chairman. If you believe that you have something that is relevant, please let him know. Of prime interest are home movies of model flying, but any item of historical interest will be welcomed. Also, the State and Territory associations have been requested to record their own histories, either in writing or on audio tape.

46th Nationals

Contrary to what I wrote in the last issue, registration for the 46th Nationals will be on December 31st 1992. The venue will be Bundaberg, about four hours drive north of Brisbane, although when I drive up from Victoria I will be going through Dalby and Kingaroy. The programme has been approved, and the 1st Bulletin should be issued soon. The CL events will be flown on the airport, RC glider at the (full size) gliding club field, and most of the other RC events at the field of the Bundaberg Aeromodellers. The FF venue is yet to be confirmed.

World Championships

It seems that Australia will not be represented at the CL, Junior FF and Indoor World Champs this year, but we will have a team at RC (but not CL) Scale and RC Electric. Bulletins for all of these Championships have been sent out to the State Associations. If you would like to attend any as a supporter, which requires paying a fee to the organisers, let me know and I will send you details.

CLASSIFIEDS

FOR SALE:EZ-Extra 230 Scale aerobatic R/C aircraft kit, RTF construction, brand new in original packaging. Priced to sell at $335.00 Call Xerxes on (07) 2792359.

FOR SALE:O.S. 5 cyl Radial engine FR-5 N.I.B. Never run and absolutely NEW!! $2000. Genuine Medical reason for selling this prized possession. Please no offers! Contact Peter Hamilton on (06) 295 8419 anytime.

FOR SALE: R.C. Hi-Boy Plane with .40 ABC motor, Challenger 720 Radio with NiCads, charger and Ni-Cad Cycler. K & B .61BB new in box. Field box with power panel, 12 volt battery, heavy duty starter, electric fuel pump, Ni-Cad checker, 12 volt soldering iron approx 12 lts fuel and heaps of accessories. There's not a cent to spend and all gear is in perfect condition. I would like $800 O.N.O. for the lot. Phone Ron on (075) 31 2784

FOR SALE: New Motors - Magnum 45 Pro $115.00, 40 Pro $110.00 Blue Bird 46 $100.00, Leo .46 $110.00, OS 25 FSR $75.00. Second Hand Motors Enya 60 four stroke $175.00. Blue Bird .46 $70.00, Blue Bird 28 $55.00, Blue Bird 25 x 2 for $80.00. Phone AH (069) 65 1369.

FOR SALE: American Remote Control Modellers Magazines. Complet collection from 1975 to 1985. V.G.C. $1.50 each plus postage. Phone: (07) 882 1153. Strathpine Qld.

FOR SALE: Ducted Fan TRIM Spectre, flown six times only. Complete with OS 91, Ramtec Fan, Springair Retracts and all specialist support equipment. Phone Peter: (03) 749 5341 (AH) Price $1900.00 (neg).

FOR SALE: Attention World War 1 Bipland Fans!!! Scratch built % scale SE5A Dennis Bryant Plan 80" span. Highly detailed suit ST2000-2500. In new condition excellent flyer $1200 - ONO. Phone Graeme: (02) 630 8111 (Work) or (047) 30 4524. (Home).

FOR SALE: 50 Model engines. New, Used and Collectable. Diesels, glos, rotary. Please send SASE for list. Peter van Meurs, Box 517, North Geelong 3215.

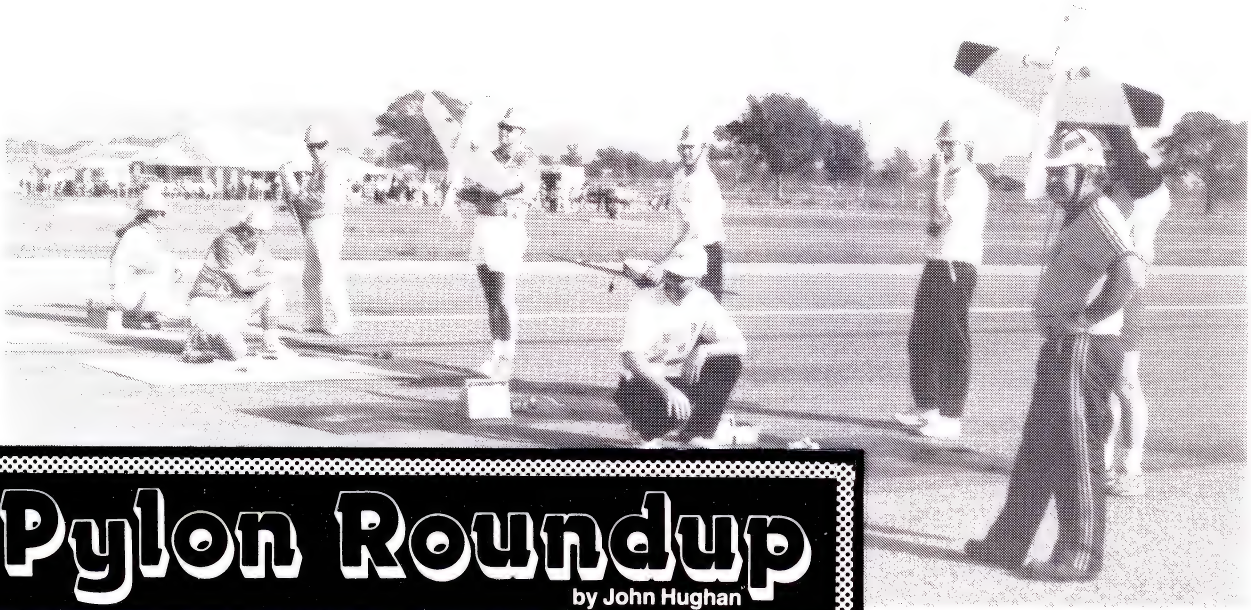
FOR SALE: Aeromodelling magazines from 1965 to present time. Many titles. Please send SASE for details. Peter van Meurs, Box 517, North Geelong 3215.

WANTED: Full size plan of Alan Shing's FAI Team Racer.Contact: Karl Wilson 42 Water View Cres., Waterview Heights Laurieton NSW, 2443.

WANTED: Webra 2.5cc Mach 2 and AMCO 3.5cc plain bearing. Tel: (03) 889 1149.

WORLD'S LARGEST CLEARANCE SALE: Engines, new in box, Saito 270 TTDP, $950, O.S. FT160 $700, Saito FAI30 Twin, $550, Sachs 3.2 cu inch, LATEST MODEL, with ign. unit $500, O.S. FS61 marine $300, Saito FA40 Mk1, exposed rods, collector engine $250, O.S. FS60, exposed rods collector engine $300, Saito 120 FS on spark ign. $600. YS 120 FS on spark ign. $650. Irvine Mills 75 $100, Sesqui 1.5D $150, Cox 010 original series $100,. ENGINES, RUN: O.S. FF320 4 cyl. run in only $1150, Wankel Latest model, run in only $250, O.S. FS120 run in only $300. A.E.10, .15cc diesel worlds smallest diesel $125, Irvine Valkyrie 5cc R/C diesel $250. COLLECTORS ENGINES: Webra 2.5D $150, Taipan 2.5ccD $150, both like new, Frog 500 runs $100, Frog 150 runs $75, Frog 80 fair $50, E.D. Bee 1cc runs $100,. RADIOS: HI TEC 7 FM, 4 servos nicds, etc, 36 mhz $225, J.R. Max computer heli 6, 4 servos nicds etc, NEW IN THE BOX $450, Futaba 9 channel, P.C.M. computer, The very TOP MODEL in metal case. BRAND NEW $1500. AIRCRAFT KITS: all untouched, E.Z. Christen Eagle, ALMOST READY TO FLY Huge one third scale, not available in Oz $850. C. G. Ultimate Bipe $225, E.Z. Diabolo 72 inch A.R.F. $350, E.Z. Super Cub 25, A.R.F. $200, READY BUILT AIRCRAFT: E.Z. FW 190 with NEW Saito 80 FS retracts & all servos, just fit Rx & batteries $700, SIG, third scale Space Walker, Zenoah G63 with Pitts type smoker exhaust, all large size servos fitted, $1250. Sopwith Pup 62 inch with FT 120 twin, and all servos fitted $800, Spitfire Mk14 1/5 scale, 88 inch span, opening canopy, scale retracts, including tailwheel BGX 35 all servos, glass fuse, magnificent, ready to fly $1500. FW 190 Balsa built up, retracts, O.S. 61 Black Head $350. E.Z. P51 Mustang with O.S. 91 Surpass retracts, all servos ready to fly $600. HELICOPTERS: Hirobo Shuttle, with O.S. 32 H full heli radio, fitted, complete with heaps of spares $450. Hirobo 888 Falcon with O.S. 61 FSR variable rate gyro needs some repair $350.

Phone CLIFF, (02) 790 1174 or (018) 65 3338.



Pylon Roundup

by John Hughan

On the start line at the World Champs: Rob Walley (NZ), Graham Cox (SA), Lyle Larson (USA) and Chugo of Japan. Starter, Gary Davidson, waits while callers hold models for identification.

There comes a time, usually after a long period, when your favourite engine loses some of its performance. Quite often you will not know that this has occurred because it happens so gradually. For all engines you should have some form of bench mark - usually a tacho reading with a particular propeller. I tacho my engines quite regularly. You usually find that the maximum revs are rather low immediately after purchase, because the engine is rather tight and needs running-in. After a while the engine will pick up revs until it gets to its highest reading when the engine has been worn into its best fit, minimum drag condition, where it shreaks like hell. Very soon after this the engine goes over the hill. The situation described above is when the piston and liner have lost their fit.

There is a situation that occurs more frequently, and this is where the bearings have become degraded. This is by far the most common occurrence with an engine. If not dealt with quickly the bearings might break up and force bits of cage or balls up between the piston and liner. This certainly ruins an engine very quickly. I will go into this more thoroughly in a future issue. Meanwhile, if you feel that there may be sticky, non-free-rolling bearings, get them replaced immediately, otherwise you may end up being very sorry.

RE-WORKING THE PISTON-LINER ASSEMBLY

This article deals with refurbishing a worn out piston on an ABC type engine; that is, Aluminium piston, Bronze liner and Chromed bore. On most occasions the piston is the part that wears; the liner, being chromed, remains in shape.

You can usually detect when an engine is over the hill because there is no nice ring around the top of the piston where it seals. The piston is all black with burnt oil and there is no indication of where the piston comes in contact with the liner to complete the piston-liner seal. The piston fit is critical, being about 80 to 90% of engine performance — without a good fit your engine will not produce its optimum performance.

There are a number of ways to regain this engine fit without going to the expense of purchasing a new piston and liner. I will detail them one at a time.

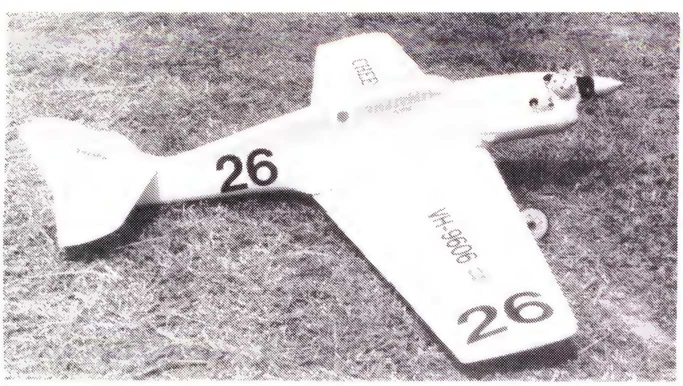
Re-Chrome the Bore

This is, in my opinion, the best method. All you need is to plate another half a thou of chrome on the bore and you should get a good fit. You have to be careful because normal chroming will leave lips around the openings in the liner; e.g. tranfer and exhaust ports. These lips will have to be removed with a hone. I suggest that you contact someone who knows what he is doing to perform the job. You can ring Andy Kerr on (02) 683 4349 [BH] or (02) 639 0539 [AH] for a quote.

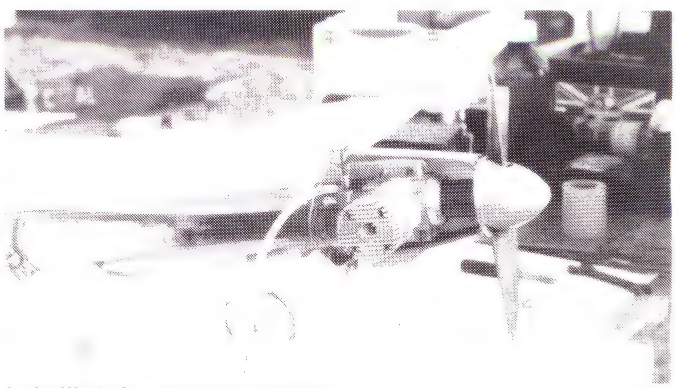
Punch Inside the Piston

Brian Steele has had great success with this method, however, I have not tried it. Take the piston out and lie it flat on its crown on a metal block. Using a centre punch and a light hammer, punch inside the piston, against the bottom of the piston crown, around the perimeter of the crown. This will enlarge the piston by moving metal in a similar way to that of panel beating for repairing a car.

After you have done this you may find that the piston is too big and it may require fitting. This is done by a process called lapping. You make up a device to hold the piston through the gudgeon pin and obtain some very fine lapping grit, about 1000 grade. You have to be very careful here, as too much lapping and you are back where you started. You have to develop a feel for what is a good fit. Make sure that after you have achieved this marvellous fit you clean all the lapping compound away from the piston and



The beautiful lines of the Nelson 45 powered Cheetah by Garry Turna at the Vic State Championships at Bairnsdale.



At the World Championships; Paul Bond of the UK had a screw-in steel front housing on his OPS. JH photo.

New Zealanders at the World Champs. John Danks selects a propeller for his Nelson powered Tsunami, while Dick Willard holds the model, a wing tip on his shoe. John Hughan with the camera.

Tuning for a new day at Wangaratta '91. Dave Shadel of the USA puts down the starter. Bruce de Chastel holds the Nelson powered Mustang. Note Bruce's mini ear muffs. Hughan pic.

liner, otherwise it will ruin your engine.

The Quench Method

This method is used by Glenn Matthews. He removes the piston, heats it up to very hot, 500°C, and drops it into iced water. "Ouch!" This has the effect of a quick normalisation of the metal, which releases stresses and causes it to grow. You may also have to lap the piston if it is too tight a fit in the liner.

I have heard of a variation of this method where you just heat up the piston and let it cool down and the piston will grow. This is of particular use when you have a new engine and you wish to run it in quickly. Instead of running the engine for hours you just heat it up to get the piston expanded and then perform a lap job. I do not do this any more and prefer to either run the engine in on the bench or in the air. I do this because it takes all the danger out of having to lap, and I believe that you end up with a better engine that way.

If your engine has been running for a large number of hours, it should be well and truly normalised and I doubt that you will get much

Very fast Folkerts of Keith Reid of England had an OPS. His caller, Edwin Woolley, holds the singing racer. Drage Air World, October 1991.

out of this heat up method. My experience is that the piston will stay the same size.

Pipe Cutter Method

I have used this a number of times and it definitely works. I purchased a wheel for a small pipe cutter and attached it to an arm that could be held in my lathe tool post. I then made up a holding device for the piston and set it in my lathe. This has to be done very accurately as the piston must be spinning dead true prior to using the pipe cutter otherwise you will get an uneven groove in the piston.

After the piston is truly in the lathe, make a groove with the pipe cutter wheel a couple of millimetres from the crown of the piston, then another groove a millimetre below that. It is essential that you do not make the cuts too big into the piston, otherwise you will have a big lapping job to perform. Lapping is usually necessary with this method.

Another variation of this method is one used by Richard Leitch. He uses a small roller bearing mounted on an arm, and after positioning the piston in the lathe he runs the roller around the top of the piston crown and around the perimeter. This has the effect of moving metal from the crown to the edges of the piston. I would say that lapping could possibly be required as well, however, not much, as this is quite a gentle metal shift.

Centre Punching the Piston Crown

Garry Davidson had a Rossi 45 that had rather a large score in the bore caused by some unknown object that had passed through the engine. Normally you would say that the piston was unrepairable and a new piston and liner assembly would have to be purchased. This is not a cheap exercise, so Garry decided to perform some miracles. He removed the head from the engine and centre punched the crown of the piston while it was still in the engine. He did most of this punching in the area of the piston score. He then removed the piston and, with some fine emery paper on top of a piece of glass, removed the burrs that were caused by the centre punching from the top of the piston. He then reassembled the engine and it ran perfectly. Since then he has performed this operation a number of times and he tells me that the big score in the piston has almost disappeared.

I tried this method a week ago with my Rossi and had excellent results. After a number of runs I removed the piston and found a perfect sea just 3 mm below the piston crown - just abou where it should be. My original problem was tha the piston had worn out so I centre punched i right around the perimeter as close as possible to the edge and punched at about a 45° angle towards the liner face, with the piston just below top dead centre. I laughed at Garry when he told me of this method - bashing the top of the piston - NEVER! However, both Garry and I now have nice-running engines, and we did not have to perform tricky lapping. Do not worry about the stress on the engine due to lightly tapping the piston. I can assure you that the piston experiences far more of a load than that while running.

Long Term Effects

With the exception of the re-chroming method the rest of the techniques are not really long term. You may find that the operations have to be repeated a number of times as the performance declines.

Other Methods

I have heard of a number of other methods which to me seem to be a lot of garbage, mainly directed to impress the recipient of the knowledge that the giver is somewhat of a expert. One such gem was the piston explosion method. How this is achieved I don't know however, it must be rather spectacular, and no one that I would place in my kit of problem solving ideas.

In a future issue I will give a run-down on how to change your bearings. ENJOY RACING.

MARINE SCENE

A Brief History and Update of TETHERED BOATS and THE SYDNEY SOCIETY of MODEL ENGINEERS

by Ron Bernhardt

The present address of the Sydney Society of Model Engineers is R53 Luddenham Road, St. Marys, an outer western suburb of Sydney. That address is a 10 hectare parcel of land known as Model Park, owned by the Society and located on the western side of Luddenham Road, just along from the T junction it forms with Elizabeth Drive.

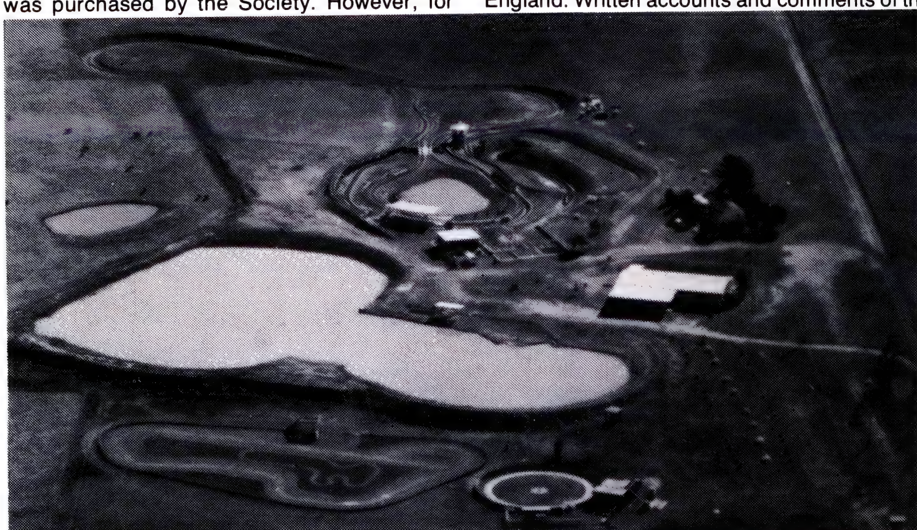
The aerial photo of Model Park shows Luddenham Road along the bottom, with the Model Park entrance gatehouse at the lower right hand corner. Tether and RC car tracks are to the left, and above that the boat pond (note tether pole in the water towards the right hand end). The main clubhouse is over to the right. The live steam locomotive layout is in the centre of the photo, with CL aircraft to the left, adjacent. The RC airfield is at the top. Picnic tables and BBQs abound.

The Society was formally founded during 1906, in the Sydney suburb of Summer Hill, and was then known as Summer Hill Society of Model and Experimental Engineers. The first public exhibition staged by the Society was held in the hall of the Ashfield Masonic Club during 1912. In about 1913 the name of the Society was changed to the Sydney Society of Model Engineers. Meetings were held at the homes of various members until the 1920s when a small block of land was purchased at 190 Parramatta Road, Ashfield. The first boat pond, an annular channel, was constructed at this site. In 1931 the adjacent land, occupied by two tennis courts, was purchased by the Society. However, for legal reasons the land title was vested in the names of three trustees: John Thornley, John Mann and Ces McKellar.

President John Mann and secretary Ces McKellar, with the assistance of the committee, steered the Society through those rapid growth years of 1932 to 1935. In that period a 70 foot diameter boat pond was completed, a 40 x 20 ft two storey brick clubhouse was built and a 2½ inch gauge railway was constructed circling both ponds. Ninety per cent of the design and construction work was carried out by SSME members. This achievement received particular reference in a written commendation from Percival Marshall to the Editor of the magazine, The Model Engineer in Australia and New Zealand (MEANZ) in 1937. These club grounds at Ashfield became known as Exhibition Park.

Marine modelling was a major activity within the SSME from foundation to beyond the mid-sixties; scale sail, power (electric, steam and i.c.) and hydroplanes. Regular hydro events were encouraged by the Society and well supported by members.

Flash steam hydroplane fever ran high when on 14th September 1935 Whirlwind, a flash steamer built and operated by Ron Cowen, bettered the then existing world record of 43.84 mph held with Chatterbox by Mr. S. Clifford in England. Written accounts and comments of the day taken from the Model Engineer and Practical Electrician (MEPE) and MEANZ reveal a number of relevant facts which are not generally known. The suggestion that the timed distance of 202.3 yards used at the SSME pond prevented a proper comparison of performance to be made between Chatterbox and Whirlwind may have been a valid point. However, as was also stated by the British MPBA secretary of the time, "No official length of course had at that time been laid down for international events".



An old aerial view of SSME Model Park at Luddenham, west of Sydney. Boat ponds and car tracks are easy to identify. The Editor has flown free flight scale at the Park, and some RC flying has been done.

The fact that Sunbeam later convincingly set a new outright record is well known. What may not be as well known is that Sunbeam was a new hull fitted with the machinery from Whirlwind! According to an article written at the time by Ron Cowen, some minor modifications had been carried out to the machinery; e.g. water pump speed.

Other boats built by Ron Cowen were Rainbow and Circe. There were, of course, many other boats and enthusiasts of the SSME and other clubs, without the support of whom the hobby-sport in Australia would not have been possible.

Also active in the '30s and '40s were:

Ergo	E. Clifford	Flash Stea
Wilit	Mr. King	Flash Stea
Coogee	E.C. Dearman & R. Sharpe	Flash Stea
Concord	W. Robson	Flash Stea
Firefly	R. Thornycroft	Flash Stea
Nance	H. Ritchie	Flash Stea
Gladfly	R. Wood & R. Thornycroft	Flash Stea
Silafros	Mr. McGee	30 cc i.c.
Sinbad	J. Hillier	30 cc i.c.
Pop-eye	N. Cooper	30 cc i.c.
Wasp	J. Jonstone	30 cc i.c.
Alpha	N. Ferguson	30 cc i.c.
Ikenhopit	Mr. Dixon	15 cc i.c.
Scat	F.H. Cooper	10 cc i.c.

There was also Harry Allen and his 5½ ft long x 10 inch beam steam tug, Cygnet.

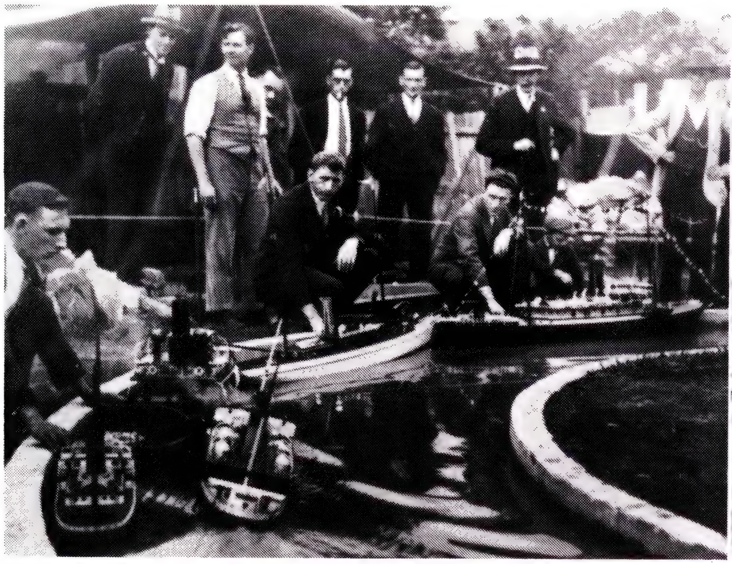
Many types of models other than hydros were operated while tethered to the centre pole.

Frank Cooper, followed by others, ran a model car around the shoulder of the large pond at the SSME Exhibition Park, Ashfield.

The triple expansion steam engine-yarrow boilered yacht Planet (A. Mathews), and the steam powered passenger liner King Edward (Lloyd Grono) also heeled on the tether. Some enthusiasts used portable centre poles at various venues around Sydney.

Norm Cooper made a 30 cc engine based on a Velocette o.h.c. engine. This engine was later fitted to a hydroplane hull built by Gems Suzor.

Mr. Tuxford made 15 cc o.h.v. four-stroke



Activity at the channel boat pond in 1932. Wharfside boats are docked while another vessel, on tether, goes past.

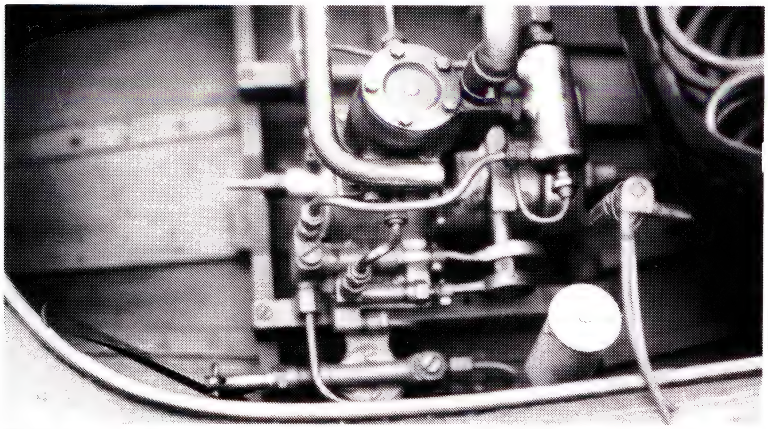
Bill Hutchings' 'Jane' on Sydney Harbour. Fort Denison in the background. A breezy day for the model posing with the vessel.

engines, and Keith Mears made 15 cc two-stroke engines for those in need. Ignition systems were conventional battery and coil or magneto on the larger engines, and glow plugs in the smaller 10 cc class when they first appeared. Later some of the larger engines sported as many as six glow plugs per cylinder head.

The challenges encountered by those model engineers in their endeavours were many and varied. Component parts were not available off the shelf, and in many cases the raw materials were from pre-used sources. Sheet German silver for water jackets came from old bullnose Morris radiator cowls. Three cell, lead-acid batteries were home made. This was model engineering from square one.

Interest and popularity in the A and B class i.c. engined hydros increased through the fifties and sixties. Several of these boats were soon giving the flash steamers some challenge. These boats and the engines were all home built. Fine examples were: Jane, by Bill Hutchins, 30 cc OHV 4-stroke water-cooled; and Popeye, by Stuart Cobcroft, 50 cc OHV V twin water-cooled.

The single stepped hydro with submerged propeller was still in favour. The flash steamers held their own, running speeds of 50 to 60 mph turning 4 inch diameter x 12 inch pitch props. However, by about 1965 the flash steam hydro at SSME had gone cold. Probably the last person to run steam hydros at Ashfield would have been Paul Walsh.



Typical single cylinder flash steam engine installation of the 1930s. Engineers had to be plumbers, too!

Of interest is a nostalgic experience that happened to Reg Wood (the reader may associate Reg with the names Bentley and Napier Lion) on his visit to the SSME Model Park, Luddenham, a few years back. During that visit he noticed among the stationary engine exhibits a familiar twin cylinder steam engine coupled to an O.B. Bolton centrifugal pump. "Is it? By gosh, it is! It's the engine I built for my flash steamer back in nineteen thirty ... was it three or four?"

A flash steamer is all model engineering. Other than maybe a few standard commercially available components (bearings, gears and so on), it is a home project.

The model aeroplane and tethered car engines from overseas manufacturers, namely Doolings and McCoys, fitted nicely into the C class boats, and by the late 1960s these were running 60 to 65 mph. Home built motors in 10 cc were also popular. Hulls had, by then, taken the more modern outrigger sponson form. Propellers were surface runners.

In the 1950s and early 1960s boat pond activity was very strong. Members literally lined up for a run. Thirty to forty boats attending was common.

The radio control of model boats had been possible for some years, but by this time had become very effective, very reliable and very affordable, making that form of modelling very attractive - to some.

In order to follow the growth of the SSME we need to go back to the mid 1940s. For a number of years after World War 2 the need for more room to accommodate the growing membership and their activities was of increasing concern to the executive and committee. In the early 1960s the SSME was incorporated; i.e. became the SSME Ltd. The title to real estate could now be held in the name of the Society. The Ashfield property was sold conditional to 12 months free occupancy by SSME Ltd. That allowed time for the purchase of a new site and vacation of Ashfield. During 1970 the Society bought the 10 hectare site at Luddenham and established Model Park. The Luddenham property, as purchased, had a dam. At one end of the new pond (dam) the old centre pole, transported from the Ashfield pond, was permanently seated. At this time marine modelling still had a strong following, with most types well represented. However, radio control was gaining popularity fast. The tether pole was soon considered by most boaters to be a navigation hazard rather than the pivot of activity.

In about 1975 tethered hydroplane activity ceased, except for the very occasional attempt by the now-and-again hydroplane airscrew types. Multi racing became popular in the late 1970s and early 1980s. The SSME executive and committee responded to the cry for a greater area of water, emptied the dam and excavated. The thought was that scale and sail should be at the tether pole end and multi racing at the other. In recent years there have been but a few dedicated radio controlled model boaters, power and sail, fighting an on-going problem of weed growth, while the tether pole stands in memory of what was once a focal section of the Society. Perhaps a challenge to those who dare?

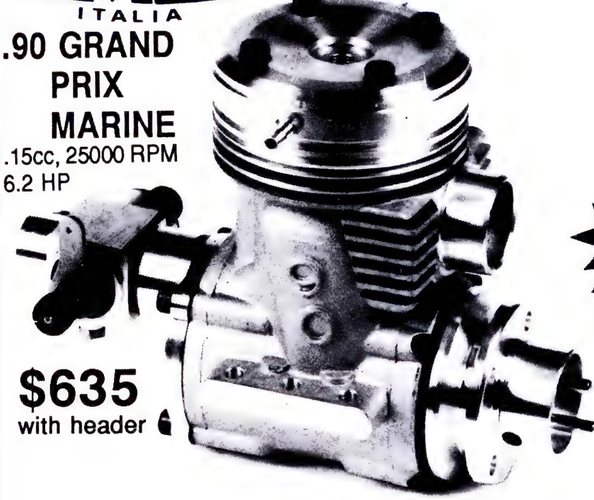
The British MPBA tethered hydro records as at 1 January 1991 are as follows:

Class	Engine	Type	Speed
A	30 cc home built	waterscrew	182.929 kph
B	15 cc home built	waterscrew	175.414 kph
C	10 cc commercial	waterscrew	211.623 kph
D	5 cc commercial	waterscrew	179.92 kph
E	2.5 cc commercial	waterscrew	177.49 kph
F	2.5 cc commercial	airscrew	230.178 kph
A/S	Flash Steam to 16 lb	waterscrew	173.917 kph
B/S	Flash Steam to 8 lb	waterscrew	111.975 kph
Novice	6.5 cc 2-stroke	waterscrew	
	10 cc 4-stroke	waterscrew	149.182 kph

MOTORI CMB ITALIA

.90 GRAND PRIX MARINE

.15cc, 25000 RPM
6.2 HP



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Stinger Hydro's

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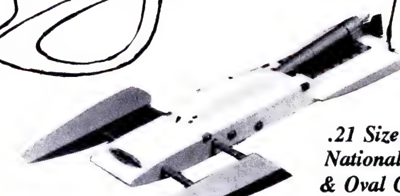

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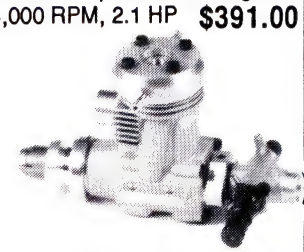

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45½ km Oval 1st: Stinger-CMB
90½ km Oval 1st: Stinger-CMB
90 Oval Hydro 1st: Stinger-CMB
90 Straight Line 1st: Stinger-CMB
21 Oval Hydro 1st: Stinger-CMB

STATE TITLES

NSW	VIC
21 Oval Hydro 1ST: Stinger-CMB	21 Oval Hydro 1st: Stinger-CMB
45 Oval Hydro 1st: Stinger-CMB	45 Oval Hydro 1st: Stinger-CMB
90 Oval Hydro 1st: Stinger-CMB	90 Oval Hydro 1st: Stinger-CMB

INDY DOWN UNDER

1990	1991
1st: 90 Stinger-CMB	1st: 2x90 Stinger-CMB
	2nd: 90 Stinger-CMB

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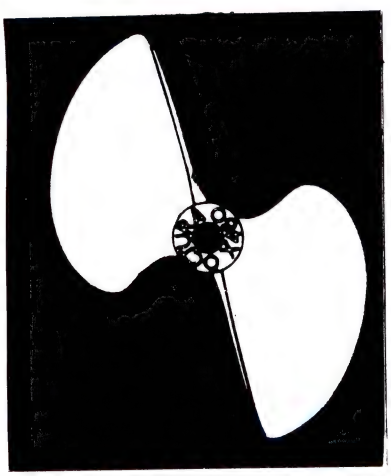

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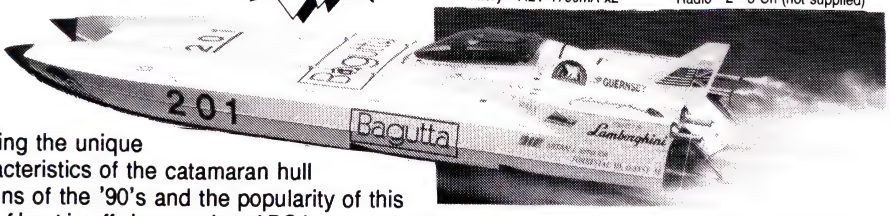
New

TECHNICAL DATA

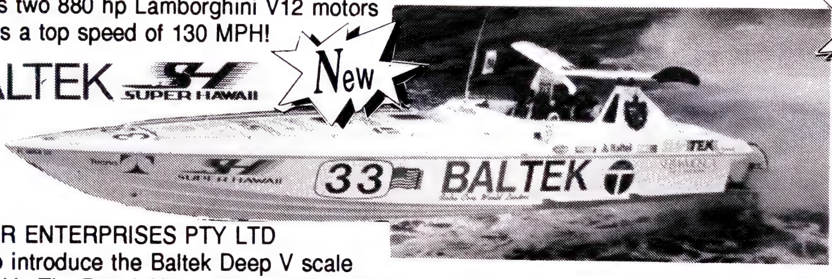
Body Length - 1050mm
Motor - M & Y 550SH x 4
Battery - 7.2V 1700mA x2
Bean - 268mm
Unit - prop drive system x 2
Radio - 2 - 3 Ch (not supplied)



Utilising the unique characteristics of the catamaran hull designs of the '90's and the popularity of this type of boat in off shore racing, ABC have made this scale model of Steve Curtis's racer, Bugatta. His driving skills are recognised the world over. Steve was the winner of the Offshore Class 1 in 1990 in Spain. By using a sealed cockpit canopy, the catamaran takes advantage of the force of air, making the boat characteristics closer to that of an airplane, making planing much easier. Bagutta has two 880 hp Lamborghini V12 motors and reaches a top speed of 130 MPH!

BALTEK SUPER HAWAII

New



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TECHNICAL DATA

Overall Length -25.5 in
Hull Length - 22.8 in
Hull beam - 5.9 in
Wing Span - 7.6 in
Weight (RTR) 44.4 oz
Power M & Y 550SH
Drive system: Super Prop-Ride
Requires: 2 Ch radio & 1700 mAh battery

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New

TECHNICAL DATA

Length - 1025mm. Beam - 230mm.
V Angle - 18°. Total Weight - 1700g.
Engine - 09-15 (not supplied).
Drive Unit/prop ride system.
Radio - 2 Ch (not supplied).
3 Sheets of Decals.

New

Weight ....4 lbs
Overall length....40.35"
Hull length ....36.25"
Width...................8.66"
V-angle ....18°

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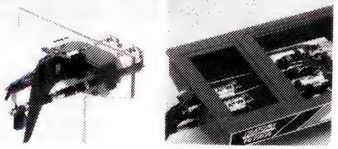

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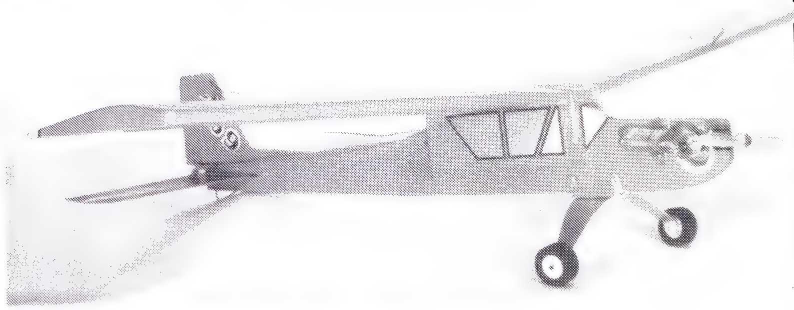

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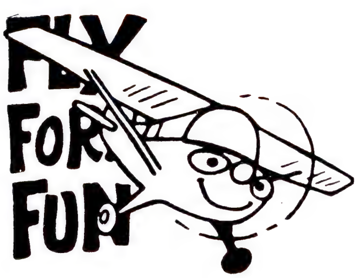

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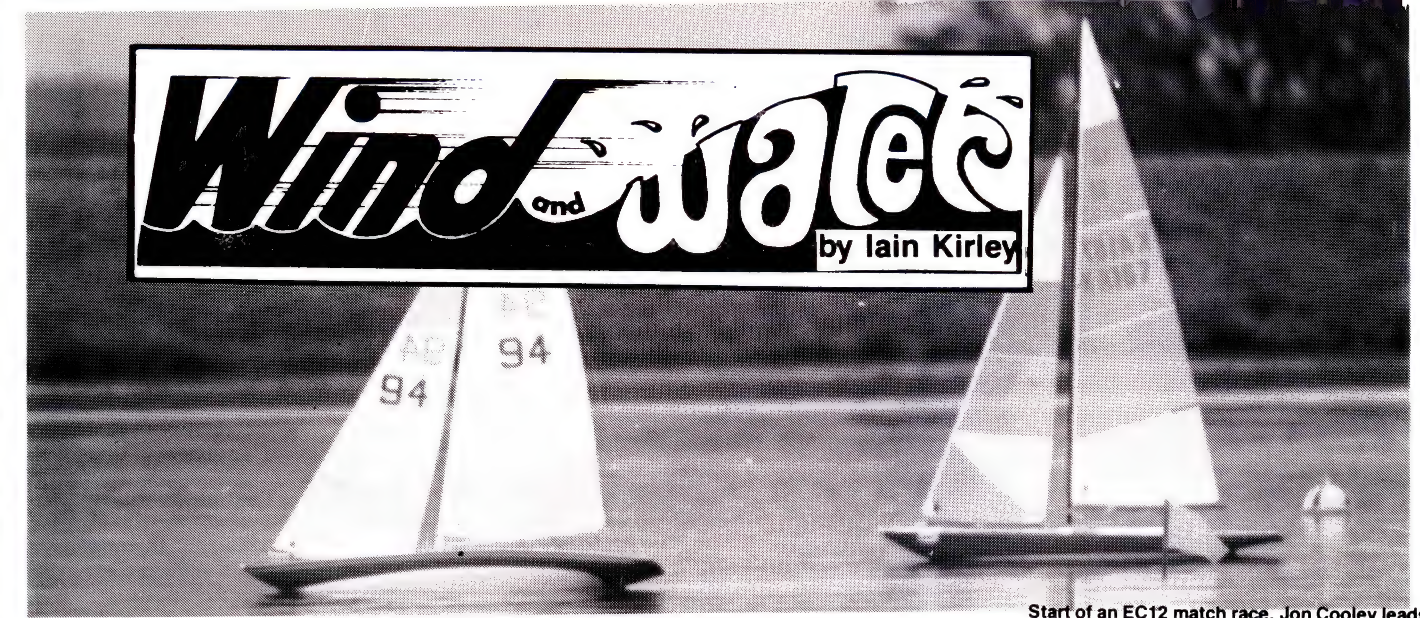
Wind and Water

by Iain Kirley



Start of an EC12 match race. Jon Cooley leads Alan Bicknell. Nice shot for comparison of the two boats by Frank Russell.

NATIONALS 1992

As noted in the last issue, the Nationals were held at Mount Penang, near Gosford in NSW, over the period 3 to 15 January. The event was a huge success, with all classes having good fleet numbers.

For each class the same format was followed in that a number of yachts were selected at random for measurement checks to verify conformation to certificates. This took the majority of the first morning, and was followed by an early BBQ lunch. All classes sailed as fleets, however, the EC12s also had three rounds of match races.

EC12; 3 to 5 January

A total of 9 skippers lined up on day 1 for the match racing in a light south-easterly to start the three rounds that were scheduled. However, the weather changed on the second day, with a southerly change, and all skippers and the organisers found that they were under-dressed for the weather, except for Bruce Webster, who brought his girlfriend to keep him warm.

The racing was close, with 5 skippers separated by only 4.7 points. Colin Cooley led the way from P. Chapman, S. Findlay, B. Webster & J. Cooley.

The friendly match racing gave way to fleet racing, where there were 8 skippers to compete against compared with the match racing's one. A number of minor indiscretions were noted by the officials, resulting in visits to the protest room. One surprise disqualification was of a skipper who, after finishing, interfered with a yacht that was still sailing. This is a rule that a lot of skippers forget about, and it was good to see the officer of the day policing the rules to the letter. The results of the fleet racing were the same for the top two: Colin was first followed by P. Chapman, A. Bucknell, J. Cooley and S. Findlay.

Paul Chisholm's RM at the ACT Titles. Photo from the columnist.

The final overall results were:

1. C. Cooley	86.4%
2. P. Chapman	83.9%
3. S. Findlay	77.2%

Marbleheads - RM; 6 to 9 January

A total of 25 skippers faced the starter in three fleets, using the fleet racing system, in which the fleet is divided initially into three equal fleets for three rounds of grading races. The skippers making up these fleets are drawn at random so that each group is different, and the skippers' best two rounds are used to grade the skippers into A, B and C fleets. From this point the idea is to stay in A fleet, as in each round the last two from A fleet are relegated to B fleet and replaced by the top two skippers from B fleet. The same happens between B and C fleets.

The RMs drew a number of top skippers. Janusz Walicki was back from Germany to defend the title he won last year, and all states had representatives, including David Burns who has been absent in the USA for the past 3 years.

At the end of the first day Janusz was the only skippper not to visit the B fleet. By the end of the first day, after seven rounds, Janusz led with 12.1 points from David Burns with 15.4 and John Gratton with 17.1.

The weather for day two was the same; 5 to 8 knots. Janusz won the first four races straight. All other skippers visited the B fleet at least once. Phillip Page, sailing Frank Russell's new Abacus design, was still sorting out the swing rig and had a few problems with a few strong gusts that hit in the late afternoon, while Ron Attard dropped a mast in the final B fleet of the day about 2 metres from the line, resulting in him dropping down to C fleet. At the end of the second day, after 15 rounds, Janusz was on 18.1 points and had the title in his pocket. J. Gratton was on 46.2 points and R. Tilbrook was on 56.7 points. D. Burns had dropped to fifth with 90.1 points.

On the third day the racing was close all day, with no skipper winning more than two races. Dave Burns won one race so convincingly that no other skipper finished within the allotted time. (Usually three minutes after the first skipper finishes any skipper not finished is considered to be a non-finisher.) As a result of the stronger winds on the day the big movers in the fleet were Dave Burns and Phil Page. In all a total of 23 rounds were sailed. A general comment on the fleet was that there was nothing between the top six boats in speed, which was a major improvement on last year.

1. J. Walicki	Ger	17.6 pts	Walicki OD
2. D. Burns	ACT	66.1	Archer
3. R. Tilbrook	69.4	Walicki	

Ten Raters; 10 to 12 January

This class had the largest entry; 26 skippers in three fleets and, although racing was close on the first day, it could be seen that the fleet was divided into three groups: a group made up of the newer boats, the 10R-2S, Scalpel and Partner designs, then a gap to a second group made up mostly of Phoenixes and Pandas, and then the older yachts. The dominance of the top group was especially noticeable in the lighter conditionson the first day. By the end of the first day Janusz was in the lead on 8.1 points, followed by A. Robinson with 23.4, H. Bell with 27.4, Colin Cooley with 28.4 and R. Tilbrook with 47.0 points.

On the second day the wind had increased, and Robinson won the first A fleet race and Frank Russell the second. After this the wind didn't know which way to come from, so setting a course was difficult. No skipper won more than one race during the day. Alan Robinson sailed well all day and at one point grabbed the lead before he paid B fleet a visit. At the end of the second day the places were as follows: Walicki; Robinson; Bell; Tilbrook; Cooley and Russell.

Day three was a day of good luck for some and bad luck for others. Alan Robinson had some good races in the morning but dropped to B fleet in the afternoon, and Walicki had some close calls but stayed in A fleet. In one race he was coming next to last and thus destined for B fleet, but he caught up to three boats that were stopped just before the line and passed two to stay in A fleet. The last three rounds basically decided the minor placings, with H. bell winning one and F. Russell the other two. The fleet sailed a total of 24 rounds of three races, which is not bad for a 3 day event.

1. J. Walicki	Ger	33.8 pts	Walicki OD
2. A. Robinson	WA	55.9	R10-2
3. R. Tilbrook	WA	60.1	Walicki

A Class; 13 to 15 January

Eighteen A class yachts lined up to contest the title and were divided into two fleets. The first day's 5 to 10 knot north-easterly with 15 knot gusts provided the best conditions of the championships so far. Rod Clack, the title holder, dominated the first day with a string of wins, followed closely by Wayne Swinnerton, and David Burns sailing in his first A class event with a borrowed boat. The highlight of the first day was the dismasting of Alan Drinkwell's boat in the third seeding race.

Conditions for the second day were even better, with a steady northerly. Dave Burns had now worked out how to get the best out of an A, and strung together five straight wins to take the lead from Rod Clack. Right on mid-day a 20 knot southerly change hit the venue and provided some interesting sailing. Cameron Clarke suffered a complete knockdown, with the fin and rudder completely out of the water. The boat righted itself and took off with the next gust. At the end of the second day David Burns was in front with 47.5 points, Rod Clack on 56.1 and Wayne Swinnerton on 89.5 points.

Day three was sailed in a light southerly breeze which veered to the north-east in the afternoon. David Burns continued to sail consistently to win the title. This was helped by visits to the B fleet by both Wayne and Rod. The highlight of the day was Cameron Clarke demonstrating the light weather superiority of the Zip design by winning five races. In total thirty rounds were sailed.

1. D. Burns	ACT	47.2 pts	Acquila Mk1
2. R. Clack	Vic	97.8	Mob Boat
3. W. Swinnerton	NSW	102.2	Wizzle Wozzle

A.C.T. BRIDGE TO BRIDGE EVENT

The Canberra Model Yacht Club decided early in the year to run an RC yachting event during Canberra Week. To ensure maximum exposure it was decided to run a long distance event in the main basin of Lake Burley Griffin, starting from the pontoon in front of Parliament House, round a pylon of the Commonwealth Avenue bridge, back through the start-finish line, around a pylon of the Kings Avenue bridge and then back to the finish line, a distance of a minimum of two miles. It doesn't sound far on paper, but when you have to walk that far it's a long way.

Nine skippers lined up for the start: six A class, a 10 rater and two RMs. The conditions were very light: 1 to 3 kph. David Burns, who was running the event, gave the starting countdown, and the race was on. Pity, the wind dropped to zero. I was able to win the start by about a minute, which was equal to about three boat lengths.

The wind remained patchy up the first leg, and the fleet split into three groups: Bill Kirwin and I hugged the shore; Bruce Kennewell and Jeff Jones reached towards the centre of the lake; and the remainder of the fleet looked for some wind. Bill was able to gain the best of the wind and led around the Commonwealth Avenue bridge pylon and commenced the long broad reach to the Kings Avenue bridge. I was second, with Bruce and Jeff not far behind.

The only drama on the first leg was having to pass the area being set up for the fireworks display, when skippers were asked for details as to the transmitting power of their units. Evidently the fireworks use electronic detonators that can be activated by high powered transmitters. Jeff Jones gave the area a wide berth but thought he had blown the place up when a worked dropped a bag of ice on a sheet of iron beside him. Jeff's comments are best left out, but he was not impressed!

By mid way up the leg to the Kings Avenue bridge Bill had a good lead, with myself, Jeff and Bruce following in close company. From this point it could be seen that tactics and luck would decide the finishing order of the three of us. With the wind dropping I was able to break away and open a small gap and make up some ground (*water?*) on Bill. Bill retained his lead around the pylon, followed by me. This is where my luck ran out. I made a tactical error in that I failed to appreciate the stronger winds towards the centre of the lake. By the time I realised my mistake Bruce had sailed past Jeff first, then me, into second place, which he held onto till the end of the race.

By then the wind had increased, resulting in a fast reaching leg to the finish. Bill easily won the race, followed by Bruce, Jeff and me. The interesting fact is that after two miles of racing the first four boats finished within five minutes of each other, after 2½ hours of racing. The gap between the boats finishing second and third was only about 10 boat lengths, with my boat only half a boat length further back. This shows how close racing can be. The remaining boats all had problems with the light conditions and withdrew halfway through the race.

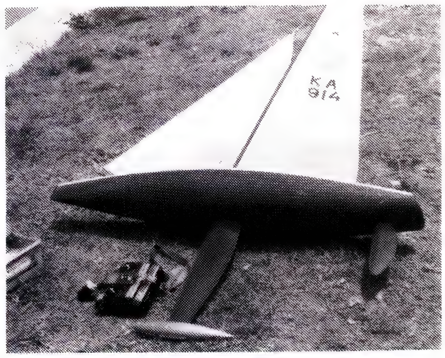
We were assisted by the local Sea Scouts, who supplied a rescue boat in case there were problems. Peter Withington, who skippered the rescue boat, was assisted by his son, but this may not be the case next year as he was seen leaving with his dad asking "When can I get an RC yacht?" So next year we may have a new club member competing.

This event has been scheduled for Canberra Week again next year, and a larger fleet is expected.

Fun sailing on Darling Harbour. An A and 3 RMs. Any other activity on Sydney's harbour? This pic by Iain Kirley.

The A class parking (mooring?) area at Mt. Penang. The easiest place for the boats between races, as they are heavy; some top 16 kg mass. This pic by Frank Russell.

THE ABACUS RM
Designed by Frank Russell



Abacus RM; kevlar deck, RMG sail winch, carbon mast. Rx antenna temporarily taped to aft deck. Russell pic.

Frank Russell's new RM, the Abacus, has been tested in the water in competition, and is now available to the public. The prototype was sailed by Phillip Page of Sydney at the Nationals, and finished fourth behind three very competitive skippers with well sorted-out boats.

This boat follows Frank's Zero and Woodpecker designs. It is narrower, lighter and has lower freeboard than the Woodpecker. The hull is finer ended in an attempt to improve the light air performance, but sufficient volume is retained in the stern to maintain good strong wind performance.

The boat is available in several different laminates, and an effort is being made to reduce the glass hull laminate to a competitive weight. The fin (removable) and rudder are female molded and use NACA sections.

The prototype yacht sailed by Phillip Page is interesting in that it carries its top suit in the form of a swing rig, and the lower working and storm rigs as normal stayed rigs. Phillip also has a Woodpecker and, to date, he believes that the Abacus is quicker. He also believes that with tuning and developments in the ballasting of the boat it will become even quicker.

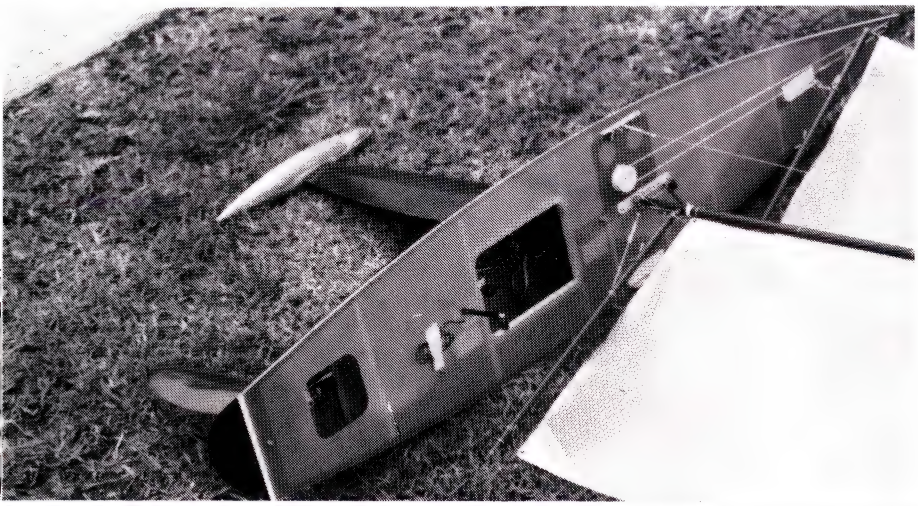
Some details of the boat are:

Class:	RM
Length:	1230 mm
Beam:	250 mm
Draft:	550 mm
Displacement:	5.0 kg

The hulls are produced by Frank to order for either soft or solid decks. Currently the hull is produced in epoxy-glass ($108), epoxy-kevlar ($142), epoxy-carbon ($175) or, on special order, epoxy-kevlar-carbon ($230). The fin and rudder are both female molded and can be supplied in either epoxy-kevlar ($60 and $25) or epoxy-carbon ($75 and $30). A kevlar deck kit is available, along with all other components to complete the boat.

Frank also advises that he has built a **Phoenix Mk2** for himself fitted with swing rigs. At the time of writing the mold was being prepared for production boats for either swing or conventional rigs. The Mk2 uses the same fin and rudder as fitted to the Abacus. A review of the Phoenix Mk2 will appear in a later issue of Airborne.

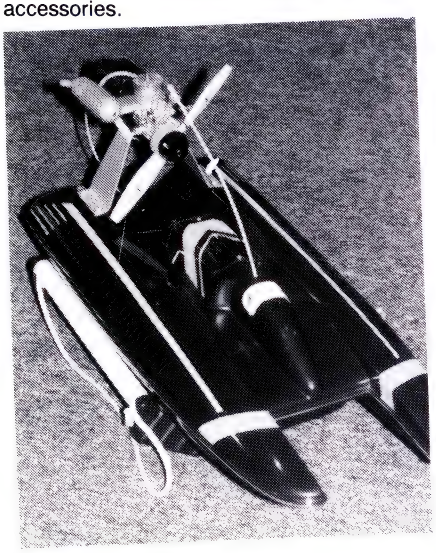
Also in a future issue will be reviews of Adrian Brewer's Zip RA design and his Swish 1 Metre design.



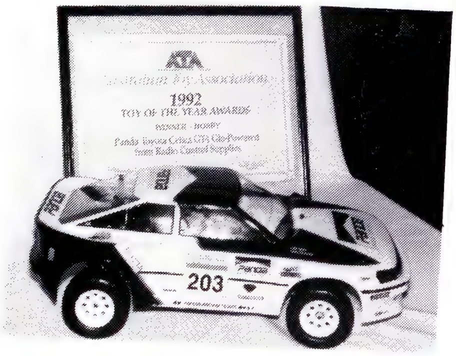
Abacus RM; carbon-kevlar hull, carbon fin and rudder. This model by Phillip Page. Photo by Frank Russell.

1992 SYDNEY TOY FAIR

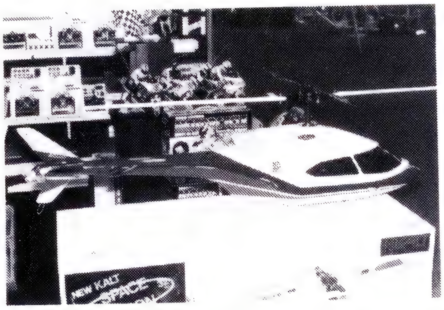
This years Toy and Hobby Fair, held at Sydney's magnificent Darling Harbour Exhibition Centre, was down on the number of visitors of previous years, but still full of interest for the buyers that attended. Several new engines were on show together with new ranges of airplane kits, innovative airboats, radios and accessories.

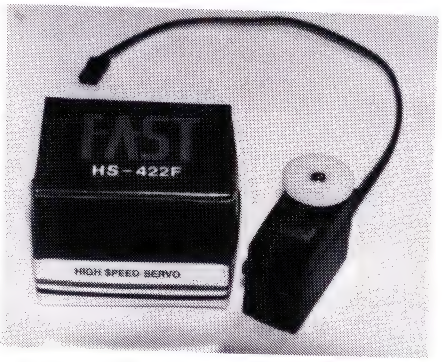


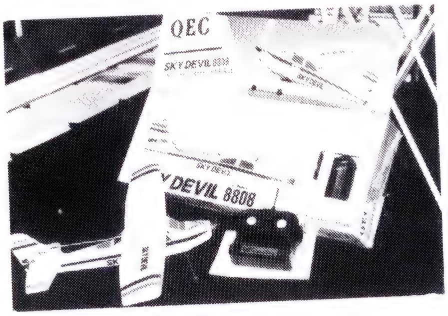
Dawn Tradings "Scream'N Demon" airboat, is an innovative design. It is very stable and has great manouverability.The hull and deck are of preformed ABS plastic, so construction time is kept to a minimum.



The Radio Control Supplies Stand showed off the winner of the Australian Toy Associations Hobby category - the .10 powered Panda Toyota Celica GT4. This ruggedly built little number really performs! Strong aluminium chassis, Thunder Tiger .10 engine with recoil starter and super tough suspension make this a really good seller with the stores.

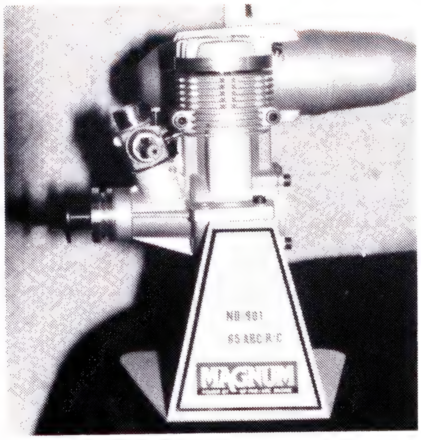


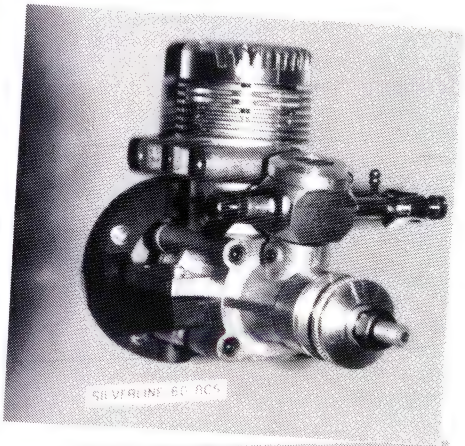


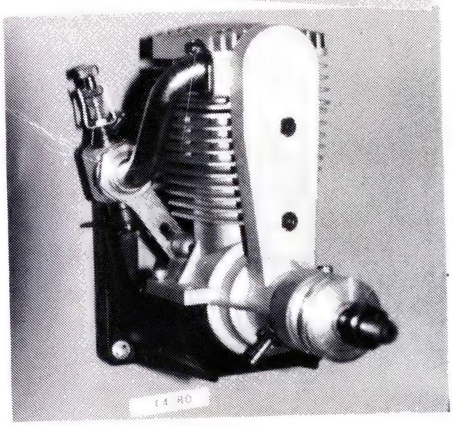


Dynaflite fun scale Corsair and Spitfires were on show at Model Engines stand together with a new Royal .46 ABC, Schnuerle ported fully ballraced engine. HITEC's new High Speed HS422F standard size servo should be a bonus for those who need extra speed servos. An interesting RC aircraft was the Styrofoam Sky Devil, a single channel RC Electric Powered aircraft, complete with RC Tx and all hardware. Charger extra.

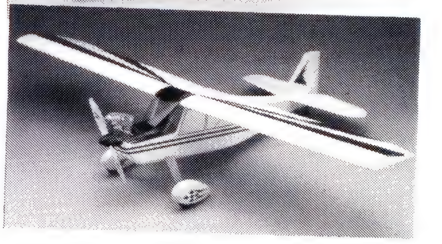
Magnum Engines introduced two new engines. The .65 GP (plain bearing) ABC and the .61 Pro ABC which is fully ballraced. The .65 GP delivers 2.0 HP at 16,000 RPM while the .61 Pro delivers 3.0 HP at 22,000 RPM. These engines are produced on Thunder Tigers new generation CNC machines, which assures you of quality of the highest order.



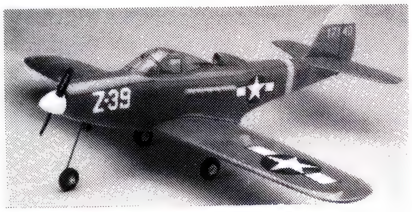




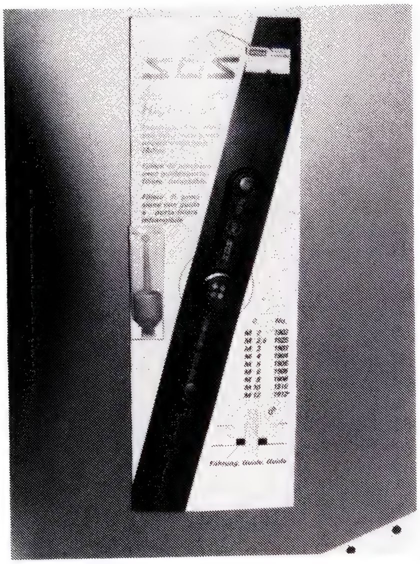
Another range of engines long established overseas but not widely promoted here in the past is Webra. Kraft Systems Australia now have the Australian agency and will be bringing in the full range of 2-Stroke, 4-Stroke and Marine engines.



Global Quality Kits, distributed by Radio Control Supplies are about to invade the stores. Range includes the top selling Skylane 45-60, as well as other Sport Models such as the Gas Stick 10, P39 Airacobra, ½A Baby



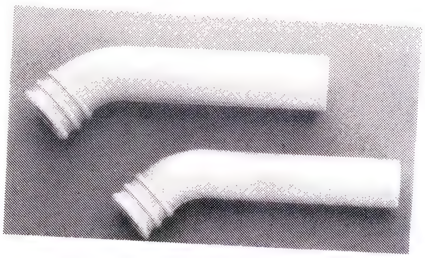
Birdie, Birdie Ten and Ridge Runt. Look for them soon.



Kraft Systems are distributing a range of dies in 4 sizes that suit the modeller. SOS are Swiss made, come with their own handles so no other tools are necessary. Make your own threaded rods etc. in sizes 2.0mm, 2.5mm, 3mm and 4mm.

Thunder Tiger has just released its high volume hand-crank fuel pump as well as their exhaust deflectors. The fuel pump works on both

forward and reverse directions is made of glass-filled nylon and includes nozzle and fuel can clunk. The exhaust diverters come in sizes to suit muffler outlets from 6 to 10 mm.



AIRBORNE PLAN

Order plans OVER THE VALUE OF $50.00 and recei

SPORT MODELS

Aero Commander: 1370 mm; Semi-scale; high wing; trike; for .19 to .40 engine; 3 ch. $12.00
Archie: 1277 mm; Biplane; TD; .35 to .40 engine; 3 or 4 ch. $11.00
Auto Gyro: Twin rotor; 675 mm span; TD; .15 to .25 engine; 3 ch. $8.00
Baby Buzzard: 1240 mm; high wing; TD; small version of Buzzard Bombshell; for .25 engine and 3 channel radio $12.00
Big Wig: 1800 mm; high wing; trike; .61 size, 5 ch; $26.00
Blo Fli: 1000 mm; High wing pusher; TD; .049 size; 2 ch $7.00
Cessna 172: Semi-scale; 1350 mm; high wing; trike; .30 to .50; 4 ch . . . $10.00
Cessna 310: 1180 mm; low wing; trike; for 2 x .15 engines; 4 ch $14.00
Cheap Trick: 930 mm; TD; .10 size, 2 or 3 channel $7.00
Cheetah: 920 mm; mini pattern model; mid-wing; trike; for 15 to .20 engine and 3 channel radio $9.00
Cherokee Babe: Semi-scale; 1350 mm; low wing; trike; for .25 to .40 engine and 4 channel radio $9.00
Comet: Sport Delta by Tony Meggs; 1630 mm; .40 engine; 3 or 4 ch. . $15.00
Crescendo III: 1680 mm; low wing; trike; .61 engine; 4 ch; Tom Prosser winning aerobatic model $14.00
Dactyl: 550 mm; flying wing; TD; .29 to .61 engine; 3 ch; with vintage look $13.00
Das Cerberus: by Danny Maslowicz. Middle Stik variant; for 3 engines of .25 engine and 3 channel radio $13.00
Das Liddle Stik: 1180 mm; shoulder wing; trike; for .19 to .40 engine and 4 channel radio $12.00
Das Middle Stik:1140 mm; shoulder wing; trike; for .25 to .30 engine and 4 channel radio $12.00
Das Mini Stik: 920 mm; shoulder wing; trike; for .15 to .20 engine and 4 channel radio $8.00
Das Ugly Stik: 1560 mm; aerobatic; shoulder wing; trike; for .40 to .45 engine and 4 channel radio $12.00
Delta 363: 1240 mm; Delta wing; trike; .35 to .40 engine, 3 ch $16.00
Dicky Birdy: 1440 mm; low wing; trike; .40 engine; aerobatic; smaller version of Dirty Birdy $12.00
Dirty Birdy: 1640 mm; low wing; trike; .60 size engine; aerobatic. $17.00
Double Max: 1520 mm; shoulder wing; trike; 2 x .19 engines, 4 ch $22.00
Divider Mk 1: 1060 mm; low wing; trike; .19 to .25 engine; 4 ch $8.00
Divider Mk 2: 1060 mm; low wing; TD; .19 to .25 engine; 4 ch $8.00
Doubloon: (2 sheets) by Bob Cozens. 1500 mm span; for 2 x .15 to .21 engines and 4 channel radio $17.00
Fancy: by Merv Buckmaster. 1700 mm span; V tail; for .29 to .49 engine and 4 channel radio $14.00
Fiesta: 1750 mm; low wing; TD; .45 to .50 engine, 4 ch; open cockpit; scale-like; aerobatic $22.00
Force 10: 1070 mm; shoulder wing; TD; 1.5 to 2.5 cc; 4 ch; aerobatic . . $10.00
Frog Jackdaw: 60 inch; high wing; TD or trike;35 to 40 engine; 4 ch . . $13.00
Fun Tiger: 1370 mm; low wing; trike; .35 to .40 engine; 4 ch; aerobatic$12.00
Fun-3: 1220 mm; low wing; trike; .40 engine, 4 ch $14.00
Gatsby: by Alan Lehmann. Biplane; span 1 metre; for .15 to .21 engine and 3 channel radio $13.00
Gere Sport: 915 mm; Biplane; TD; .15 to .25 engine; 4 ch $12.00
Guppy: 1340 mm; high wing; TD; .30 to .35 engine; 3 ch $16.00
Hanriot Du Pont: 1820 mm; Biplane; .61 size; 4 channels; scale-like, slow stable flyer $26.00
Honker Bipe: 920 mm; Biplane; TD; .09 to .25 engine; 3 or 4 ch $8.00
Hotch Potch: 920 mm; high wing; .10 to .15 engine; 4 ch; hand launch$15.00
Jumbo: 1640 mm; high wing; 385 mm chord; TD; .61 engine; 3 ch . . . $25.00
Kavellier 20: Shoulder wing; trike; wash-out wing; for .19 to .25 engine and 4 channel radio $9.00
Little Gem; by Paul Lagan. Early QM design, 1 metre span, for .15 engines$12.00
MCA: by Vin Masters. 1600 mm span; .29 to .49 engine; 4 ch; $14.00
Maricardo:; 1142 mm; mid wing; TD; .35 to .40 engine, 4 channel radio; Looks like a racer, flys like a trainer $12.00
Miss Keeto: Cabin model; 1420 mm; low wing, bi-convex aerofoil; trike or TD; for .19 to .40 engine; 3 functions $8.00
Mite: 940 mm; low wing; TD; 2 x .15 to .19 engines, 4 ch $10.00
Mongster Bipe: Biplane; 725 mm span; .15 engine; 4 channel radio . . $12.00
Moonglow VI: 1520 mm; low wing; trike; .61 size; 4 ch; aerobatic $13.00
Moon Probe: 1065 mm; low wing; trike; .19 to .23 engine; 4 ch; $10.00
New Era 3: 1120 mm; mni-pattern; low wing; trike; .19 to .30; 4 ch; . . . $12.00
Omen: by Peter Kraus. 1520 mm; .20 to .30 engines; 3 ch; $10.00
Painted Lady; 1370 mm; Biplane; TD; .45 to .61 engine, 4 ch; $24.00
Parakeet: by Russ Hammond. 1300 mm; .15 engine; 3 ch; radio $12.00
Partenavia Victor P68: 2000 mm; high wing; trike; 2 x .19 engines, 4 or 5 ch; slow flying; optional flaps $25.00
Pasadena Special: 990 mm; Mini biplane; TD; .29 to .40 engine; 4 ch; quick building $12.00
Pelago:; 1610 mm; low wing; TD; .49 to .61 engine, 4 channels; sporty cabin style $13.00
Pushover: 935 mm; High wing; .049 - .79 diesel; light weight pusher.$9.00
Pussyfoot: 1220 mm; low wing; TD; .29 to .40 engine; 4 channels; inset ailerons; open cockpit $10.00
RG 5: 1520 mm; shoulder wing; TD; .35 engine; 4 ch; symmetrical wing section; upright engine $24.00
Roulet II: 1370 mm; parasol wing; TD; .19 to .40 engine; 3 ch; $11.00
Sandpiper: 1370 or 1800 mm; shoulder wing; trike; .60 engine, 4 channels; aerobatic $13.00
Senior Telemaster: 2400 mm; high wing; TD; .61 engine; 4 ch; $28.00
Sky Chief: 1320 mm; low wing; TD; .29 to .40 engine; 4 ch; $11.00
Sky Shark: 2000 mm; high wing; 1.5 cc engine; 2 ch; powered soarer . $10.00
Skystreak: 1340 mm; low wing; trike;for 3.5 cc engine; 4 channels . . . $14.00
Snappy Mills: by Don Howie: 940 mm span; high wing; TD; .061 engine; 2 or 3 ch . $7.00
Snark: 1122 mm; low wing; trike; .35 to .40 engine, 4 ch; aerobatic . . . $11.00
Square Shooter: Simple boxy model; 1170 mm; low wing; TD; for .25 engine and 4 channel radio $9.00
Stingray: by Alan Lehmann: Delta wing; 813 mm span; for .09 to .18 engine and 3 channel radio $10.00
Strike Master: Jet fighter lines; 1365 mm span; high wing; trike; for .40 engine and 4 channel radio $14.00
Stringalong: 1900 mm; Biplane; TD; .49 to .60 engine, 4 ch; slow flyer$22.00
Swee' Pea: 1160 mm; high wing; TD; .19 to .25 engine, 3 channels; small aerobatic cabin model $9.00
Swiftee Too: 1220 mm; low or shoulder foam wing; TD; .40 engine and 4 channel radio $12.00
Tarqueen: by Merv Buckmaster; Powered soarer; 2310 mm span; for .09 to .25 engine and 2 or 3 channel radio $11.00
Tranquiliser: 1520 mm; parasol wing; TD; .40 engine, 3 or 4 ch; $11.00
Warrior; 1800 mm; low wing; trike; .61 engine, 4 ch; aerobatic $14.00
Wayfarer: 1370 mm; Biplane; .40 to .60 engine; 4 ch; $16.00
Winter Special: by Bill Winter and Bill Kaluf. 1983 version of 1947 design; for .40 4-stroke engine; 5 controls $21.00
Wot Knot: 1168 mm; shoulder wing; TD; .19 to .40 engine; 4 ch; $12.00
Yoko: 1730 mm; low wing; TD .60 engine, 4 channels, aerobatic; radial cowl; sheeted wing $13.00
Zonda: 1270 mm; shoulder wing; TD; .29 to .40 engine; 4 channels; aerobatic cabin model $11.00
½A Quanger: 1828 mm; shoulder wing; 1 cc engine; powered soarer by M. Buckmaster $13.00

TRAINER AIRCRAFT

Basica Trainer: 1260 mm; high wing; TD; .15 engine; 4 ch; $9.00
Blo Fli: 1000 mm; high wing pusher; trike; .049 size, 2 ch; $7.00
Cheap Trick: 930 mm; TD; .10 size, 2 or 3 ch; $7.00
Flying Flivver: 1130 mm; Biplane; TD: aerobatic lines of 1930s home-built; for .40 engine; 4 functions $12.00
Frog Jackdaw: 60 inch; high wing; TD or trike; 35 to 40 engine; 4 ch . $13.00
F 400: 1500 mm; high wing; trike; .40 to .50 engine; 4 ch; $12.00
Furfy Trainer: 1380 mm; for .19 to .40 engine and 4 channel radio $12.00
Gatsby: by Alan Lehmann. Sport bi-plane; span 1 metre, for .15 to .21 engine and 3 channel radio $13.00
Hot Drop 2: 1320 mm; high wing; TD; ideal first model; for .15 to .25 engine; 3 functions $13.00
MCA: by Vin Masters; 1600 mm; .29 to .49 engine; 4 ch; $14.00
Maricardo: 1142 mm; mid wing; TD; .35 to .40 engine; 4 ch; looks like a racer, flys like a trainer $12.00
MiniDrake: by Celestino Rossi. 1600 mm span pusher; for .049 engine and 2 channel radio $12.00
Miss Muffet: by Paul Lagan. Aerobatic trainer; span 1300 mm; for .25 to .40 engine; 3 or 4 channel radio $12.00
Parakeet: by Russ Hammond; 1300 mm; .15 engine; 2 or 3 ch; $12.00
P-Ship: by Merv Buckmaster; 3-piece wing for choice of 1200 or 1800 mm span; for .15 to .29 engine and 3 channel radio $13.00
RG 5: 1520 mm; shoulder wing; TD; .35 engine, 4 channels, symmetrical wing section, upright engine $24.00
Roulet II; 1370 mm; parasol wing; TD; .19 to .40 engine; 3 ch; $11.00
Sandpiper: 1370 or 1800 mm; trike; shoulder wing, .60 size, 4 ch; $13.00
Snappy Mills: 930 mm; high wing; TD; .10 size, 2 or 3 ch; $7.00
40/60 Trainer: 1485 mm; high wing; trike; .40 engine; 4 ch; $12.00

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R.C. GLIDERS (Thermal & Slope Soarers)

Airborne 88er: Thermal; by Bruce Abell. 3048 mm span; $14.00
Anymouse; Slope; 1580 mm; high wing; 3 ch; aerobatic racer; low aspect ratio $14.00
Aquilla: Thermal; 2520 mm; shoulder wing; with spoilers; 3 functions . $22.00
Ascender: Thermal; 2180 mm; high wing $11.00
ASW 17: Thermal; semi-scale, by Geoff Pentland. 3000 mm span $15.00
Avenger: Slope; 1250 mm; middle wing; 2 ch; ailerons; T-tail $10.00
A-Tail: Slope; by Mike Combe. 1240 mm span $7.00
Bolas: Slope; 1830 mm; shoulder wing; 3 ch. $10.00
Cherub D: Slope; 3074 mm; shoulder wing; 2 ch; $15.00
Condor: Thermal; by Dario Mestrovic. 2 metre span $12.00
Crystal 3: Thermal; 3750 mm; 3 ch; with spoilers $20.00
Drifter: Thermal; 3040 mm; high wing; 2 ch. $14.00
Glydalec: Thermal; by Terry Seabrook. 1800 mm span; 2 different wing designs $12.00
Frog Prince: Thermal; 60 inch; 2 ch $10.00
Golden Eagle: Slope; 1600 mm; high wing; 2 ch; fuselage and wing shape of eagle $10.00
Gus: Thermal; 1804 mm; shoulder wing; 2 ch. $8.00
Halcyon: Thermal; 2820 mm; shoulder wing; 2 ch; for light winds $14.00
Hatchet: Thermal; 2466 mm; shoulder wing; 2 ch. plus auxilliary $14.00
Hot Pants: Slope; 1520 mm; middle wing; 3 ch; fast and aerobatic $11.00
Inglefinger: Thermal; by Paul Lagan. 2500 mm span; simple 2 function floater $13.00
Javelin: Thermal; by Dario Mestrovic. 2 metre span; (2 sheets) $15.00
Kema-73: Slope; 1680 mm; high wing; 3 ch; aerobatic $11.00
Little Plank: Slope; 1420 mm; high wing; with elevons; 2 functions; can fit pusher motor $10.00
Martinet: Thermal, by Martin Simons; 2 metre span; low aspect ratio; . . $17.00
Monterey: Thermal; 2525 mm; high wing; 2 functions $10.00
Pedro: Slope; 1250 mm; high wing; 3 ch; good first aerobatic model . . . $13.00
Phase Four: Slope; 1700 mm; shoulder wing; with ailerons; 3 functions $10.00
Phase One: Slope; 1830 mm; high wing; T-tail; 3 functions $10.00
Pippita: Thermal; 2280 mm; shoulder wing; 2 channel radio $12.00
Probe: Slope; 1520 mm; high wing; 2 or 3 ch; V-tail $9.00
Rex 1A: Thermal; 2840 mm; high wing; 2 ch; $13.00
Ridge Runner II: Slope; 1820 mm; low wing; ailerons; elevators; 2 ch; . . $10.00
Riser: Unusual slope soarer, by Hugh Patrick; 2800 mm; coupled flaperons and V tail; $16.00
Slingsby Capstan: Slope; 2095 mm; high wing; 2 ch; near scale $12.00
Slingsby T31: Slope; 2064 mm; parasol wing; 4 ch; 2-piece wing $11.00
Slope Swallow: Slope; 1830 or 2750 mm; high wing; 2 ch; trainer $11.00
Soarcerer: Slope; 1320 mm; high wing; 2 ch; good first model $10.00
Soar-cy II: Slope; 1300 mm; high wing; 2 or 3 ch; aileron trainer $9.00
Standard Martini: Thermal, by Martin Simons; 2500 mm; with aerodynamic pedigree $13.00
Sunkist: Hand Launch; by John Tilley. 1340 mm span $8.00
Supa Kema 69: Slope; 1850 mm; high wing; 3 ch; T-tail $12.00
Suzy Scoot: Slope; 1420 mm; shoulder wing; 4 ch; with flaperons; highly aerobatic $10.00
Swallow: Slope, Thermal or Hand Launch; by Garth Davies and Zoltan Enoch. 1500 mm span; sleek V-tail glider $12.00
Thermal Queen: Thermal; 2525 mm; high wing; 2 channels $12.00
Tri Tri: Thermal; 2520 mm; high wing; 2 ch $12.00
Unique Monique: Slope; 1830 mm; high wing; 2 ch; quick to build $10.00
Vixen: Slope; 1600 mm; high wing; 2 ch; V-tail $10.00
Voo Doo: Slope; 1750 mm; middle wing; 2 ch; flying wing $10.00
V-2: Slope; 1780 mm; shoulder wing; 2 ch; V-tail $11.00
Windfree: Thermal; 2526 mm; high wing; 2 channels $14.00
Windsong: Thermal; by Bruce Abell. 2 metre span; refined contest sailplane $13.00
Windsprite: Slope; by Bruce Abell $9.00

POWERED SOARERS

Alpavia: Fournier scale; 1625 mm; low wing; TD; for .049 to .9 engine and 1, 2 or 3 channel radio $8.00
Bravo: 1470 mm; high wing; .09 or .15 diesel engine; 2 ch; multi purpose trainer and slope soarer; ailerons and elevator $10.00
Quanger: by Merv Buckmaster. 2400 mm span; for .15 to .40 engine and 3 channel radio $16.00
½A Quanger: by Merv Buckmaster. 1828 mm; span; for engine up to 1 cc; 2 channels $13.00
Sky Shark: by Bob Moye. 2000 mm span; 1.5 cc engine; 2 channels . . $10.00
Tarqueen: by Merv Buckmaster. 2310 mm span for .09 to .25 engine and 2 or 3 channel radio $11.00

ELECTRIC POWERED GLIDERS

Glydalec: by Terry Seabrook. 1800 mm; 2 different wing designs $13.00
Heron: by Bill Winter. 1640 mm $10.00
Urchin: by Wayne Hadkins. For 6 or 7 cells and .05 motor $9.00
Whisper: by Vin Masters. 2100 metre span; for 2 channel radio $13.00
Whisper 3: 1778 mm; for 7 cells $12.00

MISCELLANEOUS

Aircraft Floats: For aircraft up to 2 kg $6.00
Aircraft Floats: For aircraft up to 3 kg; 915 mm long $8.00

FROG SERIES

Frog Aerobat: CL stunter; for .15 engine $10.00
Frog Attacker: CL Stunter; 1270 mm span $11.00
Frog Cirrus: FF rubber; 965 mm span $10.00
Frog Diana: FF glider; 915 mm span $9.00
Frog Firefly: FF power; biplane $7.00
Frog Fox: FF power; 40 inch span; 1.5 cc diesel; pylon $8.00
Frog 45: FF power; semi-scale; 1145 mm span $10.00
Frog Goblin: FF hi-wing rubber; 610 mm span $8.00
Frog Jackdaw: RC; 60 inch span; 35 to 40 engine; 4 ch $13.00
Frog Janus: FF power; 1145 mm span; .09 diesel $9.00
Frog Jupiter: FF rubber; 930 mm span; $7.00
Frog Mamba: FF rubber; swept wing; 480 mm span $8.00
Frog Minx: FF rubber; 762 mm span $7.00
Frog Mirage: 5cc CL Team Racer (Class B) $8.00
Frog Nimrod: FF; semi-scale for .049 engine $7.00
Frog Petrel: FF Glider; 33 inch span; $8.00
Frog Powavan; FF power; pylon type; for 0.75 engine $9.00
Frog Prince: FF or RC Glider; 60 inch span; 3 ch; $10.00
Frog Radius: CL; 560 mm span; for .09 diesel $7.00
Frog Special Series: 5 rubber plans on 1 sheet $13.00
Frog Sprite: FF Rubber; 613 mm span; $7.00
Frog Stratosphere & Strato D: FF power; 1065 mm span; for .09 engine $11.00
Frog Tarquin: FF power; high swept wing; engine on pylon; 990 mm span; for .09 engine $11.00
Frog Tutor: FF power; semi-scale; 1090 mm span; for ,09 engine $11.00
Frog Vanda: FF glider; 1010 mm spam $8.00
Frog Vanda Mk II: FF glider; 1020 mm span $8.00
Frog Vandiver: CL; aerobatic; 685 mm span $9.00
Frog Vanfire: CL; 1016 mm span; .30 engine $12.00
Frog Vantage: CL; .5 cc Team Racer (Class B) $9.00
Frog Ventura: FF glider; 1065 mm span $8.00
Frog Venus: FF rubber; 38 inch span $9.00
Frog Vespa: FF glider; 762 mm span $8.00
Frog Vixen: FF power; 940 mm span; .09 engine $8.00
Frog Witch: FF rubber; 915 mm span $8.00
Frog Witch II: FF rubber; 36 inch span $8.00
Frog Wren: FF glider; 635 mm span $6.50
Frog Zephyr: FF rubber; 840 mm span $8.00

R.C. OLD TIMER & VINTAGE

Big A-Box: by Charles Barron, 1941. Enlarged to 84 inch (2130 mm) span; for .29 to .61 engine and 3 channel radio $16.00
Buzzard Bombshell: 1830 mm; high wing; TD; .29 to .49 engine and 3 channel radio $20.00
Debbie: by Nick Limber, 1939. 1900 mm span $14.00
Finneran Flyer: by Jack Finneran, 1935. 2300 mm span; for 40 4-stroke or 10 cc spark ignition engine $15.00
Frog Jackdaw: 1942. 1500 mm span $14.00
Fury: by Carl Hermes, 1950. 1600 mm span; for .15 to .40 engine (2 sheets) $14.00
Krupp's 1937 Bowden Contest Winner: 2400 mm span; for .30 to .49 2-strokes or .49 to .61 4-strokes; (2 sheets) $21.00
Long Cabin (½ Size); 1380 mm span $11.00
Rambler: by Gil Shurman, 1939. 2400 mm span (enlarged for Texaco); for .35 to .61 4-strokes (2 sheets) $22.00
Torpedo: by Les Adams, 1937. 2 metre span $14.00
Winter Special: by Bill Winter & Bill Kaluf. 1983 version of 1947 RC design; for .40 4-stroke engine; 5 controls $21.00

R.C. SCALE

Acro Star: 1270 mm; aerobatic biplane; TD; .40 engine; 4 ch; $21.00

Aeronca Champ: 1800 mm; high wing; TD; .40 engine; 4 ch; radio $13.00

Ansaldo SVA 5: 1300 mm; Biplane; TD; .40 engine; 4 channels; ailerons on upper wing only $10.00

Avro Avian: by Arthur Bugden & John Farmer. 1/4 scale; 2300 mm span; for 1.2 4-stroke engine; (2 sheets) $30.00

BAC Superdrone: by Roy Dray. 1/4 scale; 3 metre span; for .40 4-stroke engine $22.00

Baby Ace: 1650 mm; parasol wing; TD; .40 to .45 engine; 4 ch; radio $20.00

Bebe Jodel D9: 1470 mm;low wing; TD; .29 to .40 engine; 4 ch; $12.00

Bristol Bullett: 1200 mm; Biplane; TD; .61 engine; 4 ch; $14.00

Chipmunk: 1730 mm; R.A.F. trainer; low wing; TD; fixed u.c.; for .45 to .61 engine; 4 functions $22.00

Citabria: 2600 mm; high wing; TD; Superb first big plane; for .61 geared engine or .90 Quadra and 4 channel radio $40.00

De H Moth Minor: Outlines & details only, drawn by Bill East. 1/6 scale; 1400 mm span $15.00

Dewoitine D510: Outlines & details only, drawn by Bill East. 1/8 scale; 1500 mm span $15.00

Druine Turbulent: 1640 mm; 1/4 scale; low wing; TD; for .40 to .60 engine; good intro to scale $22.00

Druine Turbulent: by Wayne Fitzgerald. 1/3 scale; for 1.2 two-stroke; (2 sheets) $30.00

Edgar Percival EP9: 1788 mm; high wing; TD; .61 engine; 4 or 5 channels; near- scale crop duster with working hopper $22.00

Fairchild 24: by Ian Carter. 1/6 scale; 1800 mm span; for .40 4-stroke engine; (2 sheets) $22.00
Cowl available from the designer)

Fairey Flycatcher: 1470 mm; Biplane; TD; .61 engine, 4 channels, $30.00

Fairey Junior: by John Mauchline. 1/3 scale; 2.3 metre span; for 1.2 four-stroke (2 sheets) $33.00

Fleet Biplane: Semi-scale biplane; simple construction; 1249 mm; TD; for .40 engine and 4 channel radio $14.00

Flut-R-Bug: by Glynn Withey. 1/4 scale; 1930 mm span; for .40 2-stroke or 10 cc 4-stroke engine; (2 sheets) $21.00

Fly Baby: by Jim Brennan. 1/4 scale; 2100 mm span; for .90 4-stroke engine; (2 sheets) $21.00

Fly Baby: 1310 mm; low wing; TD; .10 to .15 engine; 4 channels; semi-scale fun model by G. Whitehead $10.00

Fokker D VII: 1510 mm; Biplane; TD; .49 to .60 engine; 4 ch; $26.00

FMA Pucara: by Hans Heck. 1/9 scale; 1600 mm span; for 2 x .25 engines; (2 sheets) $21.00

FW 190: Semi-scale; 1300 mm span; TD; .40 engine; 4 channels $13.00

Gypsy Moth: 2280 mm; Biplane; TD; for .61 geared engine or .70 Quadra; 4 channels $26.00

Hawker Fury: 760 mm; Biplane; TD; .09 engine; single channel $10.00

Hawker Hurricane: 1270 mm; low wing; TD; .09 to .15 engine, Single channel, easily modified for 2 channels $12.00

Hawker Hurricane: 1730 mm; low wing; TD; .61 engine, 4 ch., $25.00

Laser 200: by Steve Bode. 2500 mm span; for 1.8 engine; (2 sheets) $30.00

Lavochkin 5FN: by Pavel Bosak. Stand Off Scale WW2 fighter. 1120 mm span; for .35 engine and 4 channel radio $9.00

Lazy Ace: 1800 mm; Biplane; TD; .61 engine; 4 ch; $32.00

Messerschmitt 109E: 1550 mm; low wing; TD; .61 engine; 4 ch; $26.00

Morane 'N': 1420 mm; mid wing; TD; .29 to .40 engine; 3 channels; all flying tail $13.00

M.S. Epervier: Outlines & details only, drawn by Bill East. 1/6 scale; 1600 mm span $13.00

Mustang P 51: 1200 mm; low wing; TD; .09 to .25 engine; 3 or 4 ch; $11.00

Mustang P 51: 1600 mm; low wing; TD; .61 engine; 4 channels $22.00

Percival Gull: 1830 mm; low wing; TD; .61 engine; 4 ch; $26.00

Percival Provost: 1520 mm; low wing; TD; .61 engine; 5 ch; highly detailed; fixed undercarriage; flaps $26.00

Piper Cub: 1800 mm; high wing; TD; .29 to .35 engine; 4 ch; suit first attempt at scale $22.00

Pitts Special: 1120 mm; Biplane; TD; .61 engine; 4 ch; $20.00

Pitts Special: 1320 mm; Biplane; TD; .61 engine; 4 ch; aerobatic; high performer $21.00

S.E 5A: 1370 mm; Biplane; TD; lots of detail; .61 engine; 4 ch; $25.00

Spinks Acromaster: 1900 mm; TD; .61 geared or .90 Quadra; 4 ch; $26.00

Spitfire Mk IX: 1644 mm; low wing; TD; .61 engine; 4 ch; $26.00

Super Fli: 1530 mm; low wing; TD; .45 engine; 4 channel radio $20.00

Taylorcraft: 1830 mm; high wing; TD; American light plane; for .45 to .61 engine; 4 channels $28.00

Tiger Moth 40: 1270 mm; Biplane; TD; .40 engine; 4 channel radio $22.00

Tiger Moth 61: 1450 mm; Biplane; TD; .61 engine; 4 channel radio $25.00

Tony (Kawasaki Hien): WW2 fighter; low wing; TD; .60 size; 4 or 5 ch; $20.00

Volksplane: 1460 mm; low wing; TD; full flying tail; .45 engine; 4 ch; $12.00

Waco E: 1200 mm; Biplane; TD; .61 engine; 4 ch; $22.00

Westland Whirlwind: 1650 mm; low wing; TD; .30 to .40 engine; 4 ch., $20.00

CONTROL LINE

Bearcat/Zero: Profile fuselage; 735 mm span; for .15 engine $8.00

Bunyip: ½A Speed model by Ivars Dislers $5.00

De Bolt Biplane: 700 mm span; for .61 engine $11.00

Demon: Combat; 890 mm span; for .29 engine $8.00

Firecracker: by Brian Eather. Super stunter; 1500 mm span; .49 engine $17.00

Fokker Dr1: Tri-plane stunter; 800 mm span; for .19 to .25 engine $8.00

Formula S: Stunter; 1420 mm span; for .35 to .40 engine $12.00

Mike Argander Special: 1/8 scale Mini Goodyear Racer; for .09 diesel $10.00

Mini Bandolero: Profile stunter, by Frank Coombs; for .15 engine; (2 sheets) $13.00

Mini Nobler: Profile stunter, by Frank Coombs; .15 engine; (2 sheets) $13.00

Mongoose: 2 cc Speed model by Ivars Dislers $5.00

Mustang P 51: 1200 mm span; for .09 to .25 engine; also suit conversion to RC $16.00

Olympus: Profile stunter, by Frank Coombs; for .15 engine; (2 sheets) $13.00

Piranha: by Maris Dislers. For ½A Combat. Simple & tough $10.00

Rossi Sidewinder: F2A, by Robin Hiern; for .15 engine $13.00

Sam: Trainer by Esterco Barsic. 500 mm span; for .049 engine $9.00

Spud: by Maris Dislers. Combat; for .15 engine $11.00

Sundance: Stunter; 1370 mm span; for .35 engine $10.00

Tearalong: Combat; 890 mm span; for .15 engine $8.00

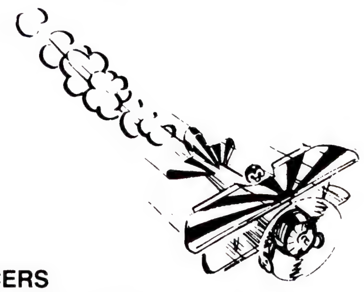
Tissue Trim: by Frank Coombs. Simple racer; for .09 to .29 engine $11.00

Trinity Trainer: by David Bevan. 600 mm span for .15 engine $7.00

U-Control Trainer: from Hobbies Illustrated 1948 $8.00

Warhawk P40: Semi scale with flaps; 1420 mm; for .35 to .40 engine $10.00

Winder: Combat; 1065 mm span; for .19 engine $14.00



PYLON RACERS

Cassutt Special: QM; 949 mm; shoulder wing; TD; .15 engine; 2 to 4 channels; $8.00

Cobra: QM; 1070 mm; semi-scale; low wing; trike; .15 engine; 2 to 4 ch; $8.00

De Bolt Special (FAI): 1240 mm; low wing; TD; .40 engine; 2 to 4 ch; $12.00

Denight Special: QM; 1070 mm; low wing; TD; .15 engine; 2 to 4 ch; $9.00

El Bandito: QM; 915 mm; shoulder wing; TD; .15 engine; 2 to 4 ch; $8.00

Hue-N-Cry: Formula S; by John Hughan $12.00

Little Gem: by Paul Lagan. Early QM design. Span 1 metre; for .15 engine; 2 to 4 channel radio $12.00

Little Mike: 1170 mm; shoulder wing; TD; .40 engine; 4 ch; $10.00

Little Toni: FAI; 1270 mm; low wing; TD; light weight; for .35 engine; 2 to 4 channel radio $12.00

Miss Cosmic Wind: QM; 890 mm; shoulder wing; TD; .15 engine; 2 to 4 channel radio $8.00

Miss Muffett: by Paul Lagan. Formula S; 1300 mm span; for .25 to .40 engine; 3 or 4 channel radio $12.00

Ole Tiger:; ½A; 790 mm; mid wing; TD; .049 to .051 engine; 2 ch; $7.00

P. 51 Mustang: FAI; 1450 mm; low wing; TD; .40 engine; 2 to 4 ch; $16.00

Photon: by Danny Maslowicz. QM; 1200 mm; .15 engine; 2 to 4 ch; $12.00

Rivets: FAI; 1220 mm; low wing; TD; .40 engine; 4 ch; $13.00

Shoe String: QM; 1015 mm; shoulder wing; TD; 4 ch; $9.00

Teara: by Max Kroone. Formula S; 1200 mm; .40 engine; 3 ch; $14.00

3 in 1: Shoe String, Dick Ohm, Ole Tiger; QM; 1020 mm shoulder wing; TD; .19 engine; 2 to 4 channel radio $8.00

R.C. PATTERN

Atlas: 1660 mm; low wing; trike; .61 engine; 4 ch; $17.00

Curare 40: 1420 mm; low wing; trike; .40 engine; 4 or 5 ch; $14.00

Curare 61: 1640 mm; low wing; trike; .61 engine and 4 or 5 ch; $16.00

Dicky Bird: 1420 mm; low wing; trike; .60 engine; 4 ch; $17.00

Eagle: by Tom Prosser; 1900 mm; 10 cc gear drive or 1.2 4-stroke engine $20.00

Spectre: 1650 mm; low wing; trike; .61 engine; 5 ch; flaps $14.00

U.F.O.: 1650 mm; low wing; trike; .61 engine; 4 or 5 ch; $20.00

HALF A OLD TIMER DESIGNS

Anderson's Pylon: 1937; 1130 mm span $10.00

Ehling's 1937 Gas Model: 1300 mm span $11.00

Lanzo Record Breaker: 1200 mm span $11.00

MG: by Mike Granieri. 1300 mm span $11.00

PB2: by Thracy Petrides. 1200 mm span $11.00

Rambler: by Gilbert Shurman. 1200 mm span $11.00

Playboy Cabin: 1300 mm span $11.00

AIRBORNE PLANS SPECIAL OFFER

Order plans OVER THE VALUE OF $50.00 and receive any other plan of your choice to the value of $15.00 FREE.

FREE FLIGHT

SCALE (Power)—

Bristol M1C: by Celestino Rossi.
900 mm span; for 1 cc engine **$10.00**
Convair Charger: by Ted Oram. 600 mm span; twin boom for twin rubber motors; (2 sheets). **$12.00**
Piper Pawnee: by John Polett1.
1300 mm span; for 1.5 cc engine **$12.00**
Polish RWD4: by Jim Fullarton.
1040 mm span; for 0.8 cc engine **$12.00**
Taylorcraft Auster 4: by Paul van Leuven.
1 metre span; for 1 cc engine or electric power **$10.00**

SCALE (Glider and Rubber) —

Albatross D5: 450 mm span **$5.00**
Bell Aircobra: 600 mm span **$5.00**
Blackburn Skua: 590 mm span **$5.00**
Bristol Troup Glider: 710 mm span **$5.00**
CAB Minicat: 490 mm **$5.00**
Caudron Cyclone: 570 mm span **$5.00**
Curtiss Ascender: 410 mm span **$5.00**
Curtiss P40 D: 620 mm span **$5.00**
Douglas XB 42: 280 mm span **$5.00**
Fairchild (24) Argus: 750 mm span **$5.00**
Fairchild PT 19: 640 mm span **$5.00**
Fairey Barracuda: 360 mm span **$5.00**
Fiat G50: 680 mm span **$5.00**
General Aircraft Hotspur Glider: 590 mm span **$5.00**
General Aircraft Skyfarer: 740 mm span **$5.00**
Grumman XH4F: 460 mm span **$5.00**
Hawker Hurricane: 560 mm span **$5.00**
Howard GH1: 620 mm span **$5.00**
Interstate Cadet: 770 mm span **$5.00**
Luscombe 10: 590 mm span **$5.00**
Messerschmidt: 530 mm span **$5.00**
Miles Magister: 700 mm span **$5.00**
Miles Masters: 580 mm span **$5.00**
Miles Mohawk: 530 mm span **$5.00**
M.I.G. 3: 570 mm span **$5.00**
N.A. Mustang: 580 mm span **$5.00**
Rearwin Speedster: 700 mm span **$5.00**
Rearwin Speedster 6000: 510 mm span **$5.00**
Schweizer TG2 Glider: 780 mm span **$5.00**
Spitfire: 690 mm span **$5.00**
Spitfire 9: 440 mm span **$5.00**
Stormovik IL2: 740 mm span **$5.00**
Taylorcraft: 820 mm span **$5.00**
Taylorcraft L2B: 620 mm span **$5.00**
Vultee Vanguard: 600 mm span **$5.00**
Waco E: 530 mm span **$5.00**

POWER —

BeCa F1C: by Celestino Rossi. 1600 mm span **$11.00**
Jimmy 2 F1C: by Stuart Sherlock. 1800 mm span **$12.00**
Provincial: 813 mm; 1950 ½A power model by Bernard Marsh **$7.00**

OLD TIMERS & VINTAGE

AK 42: by Alan King, 1950.
42 inch span (1067 mm); for .12 engine **$11.00**
AK 48: by Alan King, 1948.
48 inch span (1200 mm); for 2 cc engine **$11.00**
B.B.: by Alex Barter and Bob Howie.
1580 mm span **$10.00**
Bikini: 1946 French model; 1520 mm; 1.5 cc. **$10.00**
Bunch Cadet Major: 1935.
800 mm span; for rubber power **$10.00**
Crowbar: 1210 mm; for 2.5 cc; by Basil Healy **$10.00**
Duplex: by Chet Lanzo, 1937.
1100 mm span; for rubber power **$11.00**
Eastern States Gas Champ: by Russell Simmons, 1940.
1 metre span; for 0.8 cc engine **$10.00**
Floater: by Jim Fullarton, 1939.
1 metre span; for rubber power **$10.00**
Fly Baby Cabin: by Pete Bowers, 1946.
1200 mm span; for 1.5 cc engine;
2 sheets with float plans included **$13.00**
Flying Midget: by Thracy Petrides, 1937.
1200 mm span; for 1.5 to 2.5 cc engine **$11.00**
Flying Pencil Junior: by Alan King, 1952.
1300 mm span; for 2.5 cc engine **$12.00**
French's Rubber Model: 1940. 800 mm span **$10.00**
Gnat: by Claude McCullough, 1941.
1 metre span; for 2.5 to 5 cc engine **$11.00**
Golden Boomerang: 1118 mm; 1946 power model; for 2.5 cc; by Adrian Bryant **$7.00**
Gregory's State Champ: 1949.
1300 mm span; for 2 cc engine **$11.00**
Hi Climber: by Earl Stahl, 1939.
800 mm span; for rubber power **$9.00**
Ibis: by Tim Hervey, 1934.
1 metre span; for rubber power **$11.00**
Keycraft Firefly: Cabin style; 600 mm span; for rubber power **$10.00**
Long Cabin: ½ span **$8.00**
Megow Kadet: by Phil Karnow, 1939
1308 mm span **$9.00**
Parachute Plane: 1 metre span; for rubber power **$11.00**
Pinnuto: by F. Conte, 1943.
1200 mm span; for rubber power **$12.00**
Red Zephyr: by Scientific, 1940.
1800 mm span; for 5 to 10 cc engine **$15.00**
Renning's Class C Stick Trainer: 890 mm span; for rubber power **$7.00**
Simplex: by Paul Plican, 1941.
1500 mm span; for 1.5 to 5 cc engine **$11.00**
Torpedo: by Les Adams, 1937.
2 metre span; for 2.5 to 6.5 cc engine **$13.00**
Women's Weekly Cabin Monoplane: 1935.
900 mm span; for rubber power **$11.00**
See also Frog Series on previous page.

RUBBER —

Felstead's F1D: Microfilm design by Boyd Felstead.
600 mm span **$11.00**
Hexagon Classic P30: by Celestino Rossi.
760 mm span (30 inches) **$10.00**
Tumbleweed Coupe d'Hiver: by John Lewis.
1200 mm span **$11.00**
Waltzing Matilda Wakefield: by Paul van Leuven.
1300 mm span **$11.00**
Warrigal Wakefield: by Allan Edwards.
1100 mm span **$10.00**

GLIDERS —

Bergami A1: by Celestino Rossi. 1300 mm span **$12.00**
Index: by Merv Buckmaster. 1800 mm span. **$11.00**
Panash A2: by Peter Nash. 2100 mm span .. **$12.00**
Reynard A1: by Dave Simons. 1400 mm span **$11.00**
Teen Machine A1: by Alan Hinds. 1300 mm span **$11.00**

PEANUT SCALE

Davis D1K	**PZL 11c**
Gugnuc	**Tiger Moth**
Druine Turbulent	**Tipsy Nipper**
Hyperbipe	**Zlin 250 L**
Puss Moth	

Any 1 plan for . . **$3.00**	Any 6 plans for . . **$6.50**
Any 2 plans for . . **$4.00**	Any 7 plans for . . **$7.00**
Any 3 plans for . . **$5.00**	Any 8 plans for . . **$7.50**
Any 4 plans for . . **$5.50**	
Any 5 plans for . . **$6.00**	**All 9 plans for . . $8.00**

MISCELLANEOUS

Mini Cardinal: by Mick Nearmy.
400 mm span; for CO_2 .... **$7.00**
Ryan PT20: by Celestino Rossi
500 mm span; for CO_2 .... **$8.00**

If you have an interest in any aspect of World War One aviation, you are cordially invoted to join **The Australian Society of World War One Aero Historians.**
For membership details contact the Secretary, Keith Keohane, 3 Alkira Circuit, Narraweena, NSW, 2099; phone (02) 982 3040.

YACHTS

Chez-When: Near scale; 915 mm; 2 ch **$13.00**
Lightwave: RM; by Adrian Brewer **$10.00**
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Toy & Hobby Junction, 13B Kippax Fair, Holt, 2615; **(06) 254 0809**

N.S.W.

ABC Models (Aust.) P/L, Shop 1, 72 Archer St, Chatswood, 2067;**(02) 415 2725**
ABC MODELS (Aust.) P/L, 58 Stoney Creek Rd., Bexley, 2207;**(02) 50 6170**
Bergs Hobbies, 181 Church St., Parramatta, 2150; **(02) 635 8618**
Bryzen Hobbies, 47 MacQuarie St., Fennell Bay, 2283; **(049) 59 1145**
Control Tower, 183 Anderson Drive, Beresfield, 2322; **(049) 66 1083**
Hobbyco, 417 George Street, Sydney, 2000; **(02) 29 7461**
Hobby Headquarters, 14/10 Yalgar Road, Kirrawee, 2232; **(02) 545 1944** **Fax: (02) 545 1340**
Hobby World, 46 Treacy Street, Hurstville, 2220 **(02) 570 8444**
Jordal Hobbys, 1-31 Forge St., Blacktown, 2148; **(02) 622 9996**
Jordal Hobbys, 350 Penshurst St., Willoughby, 2068; **(02) 417 2128**
Jordal Hobbys, 397 Anzac Parade, Kingsford, 2032; **(02) 662 1025**
Kellett's Hobbies, 17-19 Memorial Avenue, Liverpool, 2170;**(02) 602 2333** **Fax: (02) 602 6298**
Model Sports, 19 Princess Highway, Fairy Meadow, 2519; **(042) 84 0813**
Rowe's Hobbies, Shop 2, 2-6 Castlereagh St., Penrith, 2750;**(047) 21 2936**
Toy Co., 143 Auckland St., Bega, 2550; **(064) 92 2301**
Toyman Imports Warehouse, 76 Railway St., Yennora, 2161;**(02) 632 5002**
Vaggs Radio Models and Hobbies, Crn. Kiora Road and Kingsway, Miranda, 2228; **(02) 525 5797**
Wings'N'Things, 236 Victoria Rd., Gladesville, 2111; **(02) 816 2699**
Wyoming Sports and Hobbies, Shop 15, Wyoming Shopping Centre, Wyoming, 2250 **(043) 28 4271**

VIC.

ABC Models (Aust.) P/L 424 Station St., Box Hill, 3128; **(03) 890 6845**
ABC Models (Aust.) P/L 118 Foster St., Dandenong, 3175; **(03) 792 9528**
ABC Models (Aust.) P/L 1138 Mt. Alexander Rd., Essendon, 3040; **(03) 374 2711**
ABC Models (Aust.) 46B Beach St., Frankston, 3199; **(03) 783 4288**
Airspeed Hobbies, Shop 3A, 434 Maroondah Highway, Ringwood, 3136; **(03) 879 4055**
Brosters Toys and Hobbies, 46 Murphy St., Wangaratta, 3677;**(057) 21 8708**
Chuckle Charm, 110 Little Bridge St., Ballarat, 3350; **(053) 31 1642**
Dee R.C. Models, 14 Tallarook St., Seymour, 3660; **(057) 92 3610**
Finescale Models, Shops 4 & 5 Central Arcade, Murray St., Colac, 3250; **(052) 31 4289**
Fliteline Models, 9 Pilgrim Crt., Ringwood, 3134; **(03) 873 4252**
Fosters Hobbies, Unit 12, Eastern Trade Centre, Cnr Canterbury & Colchester Roads Kilsyth South, 3137; **(03) 761 4349**
FM Hobbies Bendigo, P.O. Box 1126, Strathfieldsaye, 3551;**(054) 39 5842**
Full Ahead Aust., 56 Ladd St., Watsonia, 3087; **(03) 435 6592**
Hamilton Hobbies, 140 Thompson St., Hamilton, 3300; **(055) 72 4590**
Hawthorn Hobbies, 733 Burwood Rd., East Hawthorn, 3122;**(03) 882 7521**
Hobby Hangar, 1 Derby Rd., Caulfield East, 3145; **(03) 571 4788**
Hobby Place, 282 Lonsdale St., Melbourne, 3000; **(03) 663 4407**
Hobby Service Electronics, 85A Hoffmans Rd., Niddrie, 3042;**(03) 337 0751**
Metropolitan Model & Hobby Centre, 147 Springvale Rd., Nunawading, 3131; **(03) 877 6692**
Micro Electronics, 20 Glyn Street, Belmont, 3216; **(052) 44 2336**
Morwell Toy Kingdon, 113 George Street, Morwell, 3840; **(051) 341 1144**
N.C. Helicopters, 98 Derby St., Kew, 3101; **(03) 861 6017**
Orchards Hobbies, 85A Hoffmans Rd., Niddrie, 3042; **(03) 331 0656**
Portland Hobby Hangar, 25 Townsend St., Portland, 3305; **(055) 23 3764**
R.A.B. Hobbies, 461 South Road, Moorabbin, 3189; **(03) 553 4625**
Swan Hill RC Hobby Supplies, Boga St., Lake Boga, 3584;**(050) 37 2369**
Tates Performance Hobbies, 135 Shannon Ave., Geelong West, 3218 **(052) 22 4201**
The Hobby Consultants, 17 Seaview Road, Cockatoo, 3781;**(059) 68 8293**
Victorian Hobby Centre, 1st Floor, 21A Swanston St., Melbourne, 3000; **(03) 650 4817**
Williamstown Hobbies, 17E Slough Road, Altona, 3018; **(03) 398 1467**
Wimmera Hobby Supplies, 12 Firebrace St., Horsham, 3400;**(053) 82 2319**
Wingspan Hobbies, 9C Clarke St., Lilydale, 3140; **(03) 735 3466**

QLD.

ABC Models (Aust.) P/L 48 Bundall Rd., Sorrento, 4217; **(075) 38 9433**
Bundaberg Hobby World, 100 Barolin St., Bundaberg, 4670;**(071) 52 7286**
Downs Hobby Supplies, c/o The Hooper Centre, Hume St, Toowoomba, 4350 **(076) 38 5322**
Gabba Hobbies, 622 Stanley St., Wooloongabba, 4102; **(07) 844 7735**
Model Sports Queensland Pty. Ltd., 33 Station St., Nundah, 4012; **(07) 266 2260**
Mr. Toys Toyworld, 3379 Pacific Highway, Springwood, 4127;**(07) 208 9750**
Mr. Toys Toyworld, 721 Gympie Rd., Lawnton, 4510; **(07) 205 4153**
RC Helicopters Aust., 9 Smailes Rd., Jimboomba, 4280; **(075) 46 0139**
Rondels, 355 Kent Street, Maryborough, 4650 **(071) 21 3120**
Skate, Cycle & Leisure, Shop 28, Nerang Fair, Nerang-Beaudesert Rd, Nerang, 4211; **(075) 96 2911**
Southside Hobby Centre, 216 Logan Rd., Buranda, 4102; **(07) 393 0537**

S.A.

ABC Models (Aust.) P/L, 117 Unley Rd., Unley, 5061; **(08) 373 1191**
ABC Models (Aust.) P/L, 208 Park Terrace, Salisbury Plain, 5109; **(08) 258 4485**
Hobby Habit, 462 Main North Rd., Blair Athol, 5084; **(08) 349 6242**
Marine Arts & Hobbies, 17 Old Port Canal Shopping Centre, Port Adelaide, 5015; **(08) 341 2090**
Model Flight, 42 Maple Ave., Keswick, 5035; **(08) 293 3674**
Model Mania, 253 Main South Rd., Morphettvale, 5152; **(08) 382 4957**
Northern Discount Hobbies, Corner North East & Tartan Roads., Holden Hill, 5088; **(08) 261 8929**
South Australian Hobby Centre, 1st Floor, 135 Rundle Mall, Adelaide, 5000; **(08) 232 0080**

N.T.

North Australian Model and Hobby Supplies, 61 Dalwood Crescent, Sanderson, 0812; **(089) 27 7254**

W.A.

ABC Models (Aust.) P/L, 48 Pier St., Perth, 6000; **(09) 325 8117**
Ace RC Models, 314 Great Eastern Highway, Midland, 6052;**(09) 274 4519**
Canard Composites, P.O. Box 380, Hillarys, 6025; **(09) 305 1613**
Discount Hobby Supplies, 454 Newcastle St., West Perth, 6005; **(09) 227 6789**
Discount Hobby Supplies, Unit 5, 27 Augustus St., Willeton, 6155 **(09) 354 3019**
North Beach Cycles & Hobbies, Shop 2, 117 Flora Tce., North Beach, 6020; **(09) 447 1450**
Perth Hobby Centre, 385 Murray St., Perth, 6000; **(09) 322 3376**
Radio Model Suplies, 235 Albany Hwy., Victoria Park, 6100;**(09) 362 2133**
South West Model & Hobby Centre, Shop 7, Bunbury Blvd., Princess St., Bunbury, 6230; **(097) 21 8487**

TAS.

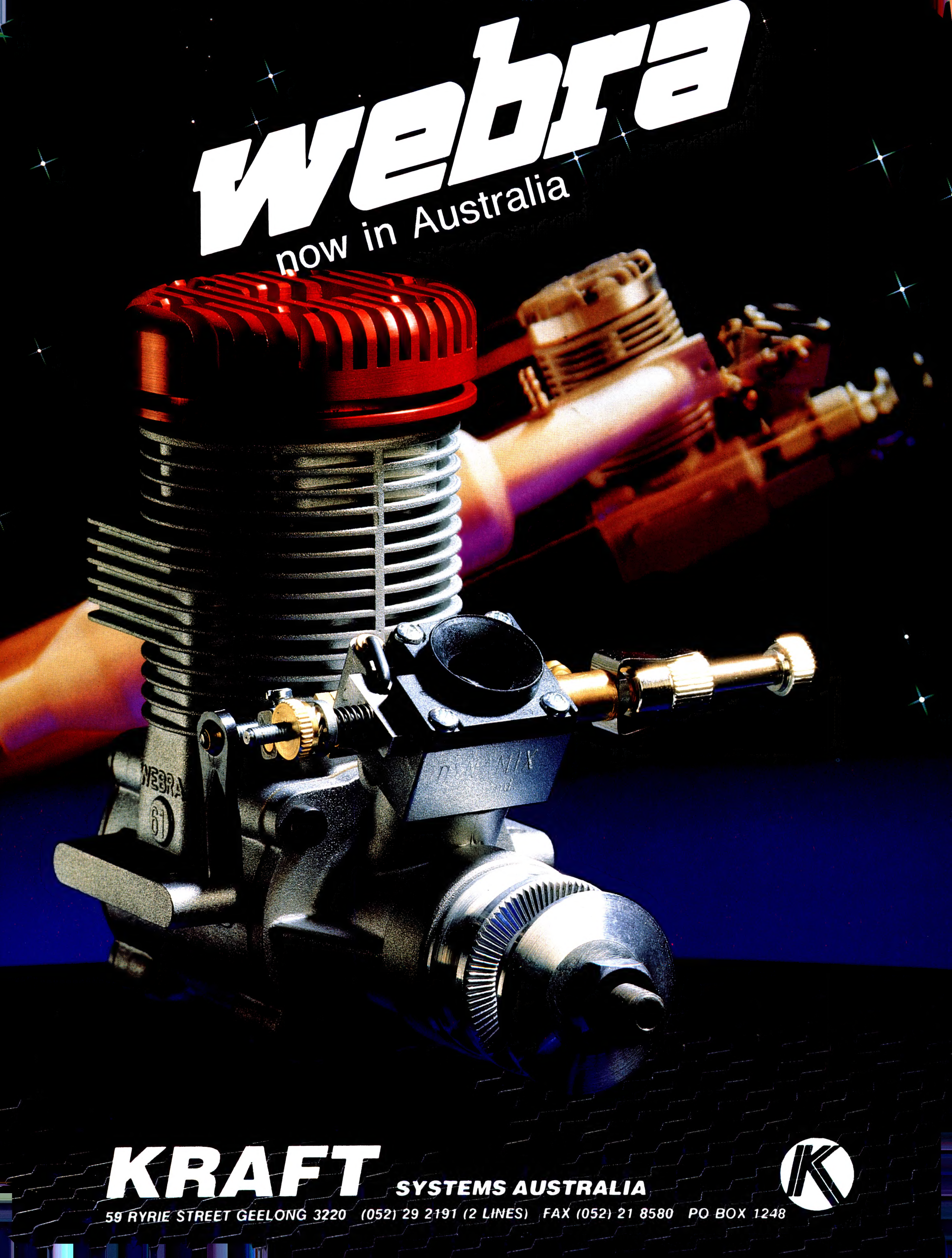
Toy Warehouse, 211 Invermay Road, Launceston, 7250; **(003) 26 1577**

P.N.G.

G.S. Model Construction P/L, P.O. Box 6385, Boroko, Pupua New Guinea; **Fax: 675 21 2795**

WHOLESALE SHOP & SERVICE GUIDE

Advanced Hobbies (International), P/L 424A Station St., Box Hill, Vic. 3128; **(03) 890 0660**
Adhesive Solutions, Unit 2G, 1-7 Unwins Bridge Rd., St. Peters, NSW, 2044; **(02) 550 6355**
Australian Model Aerodrome, 367 St. Georges Rd., North Fitzroy, Vic., 3068; **(03) 489 8282 & 489 8383**
Bryzen Hobbies, 47 Macquarie St., Fennell Bay, NSW, 2283;**(049) 59 1145**
Competition Engines, 350 Penshurst St., Willoughby NSW, 2068; **(02) 417 2128**
Dawn Trading, 17 Tentenden Rd., Botany, NSW, 2091; **(02) 666 4999**
Full Ahead Aust., 56 Ladd St., Watsonia, Vic., 3087; **(03) 435 6592**
F.S.A., 4 Derby Road, Caulfield East, Vic., 3145; **(03) 571 4984**
Hobby Headquarters, 14/10 Yalgar Rd., Kirrawee, NSW, 2232;**(02) 545 1944**
Kraft Systems, 59 Ryrie St., Geelong Vic., 3220; **(052) 29 2191**
Lion Electronics, 8 Irwin St., Bellevue, WA, 6056; **(09) 250 1929**
Model Engines (Aust.), 57 Crown St., Richmond, Vic., 3121;**(03) 429 2925**
Model Helicopters International, 98 Derby St., Kew, Vic., 3101; **(03) 853 6017**
Modelcraft Industries International, P.O. Box 471, Hillarys, WA, 6025; **(09) 401 3646**
O'Reilly, Leo, 42 Maple Ave., Keswick, SA, 5035; **(08) 297 7349**
Radio Control Supplies, Unit 7, Lot 14 Dean Place, Penrith, NSW, 2750; **(047) 21 3669, (047) 31 4145**
Southern Model Supplies, P.O. Box 112, Daw Park, SA, 5041; **(08) 276 7722**
Tates Performance Hobbies, 135 Shannon Ave., Geelong West, Vic., 3128; **(052) 22 4201**
Wastern Flying School, 1/31 Forge St., Blacktown, NSW, 2148; **(02) 622 9996**
X-Cell Products, P.O. Box 67, Ramsgate, NSW 2217; **(02) 588 6453**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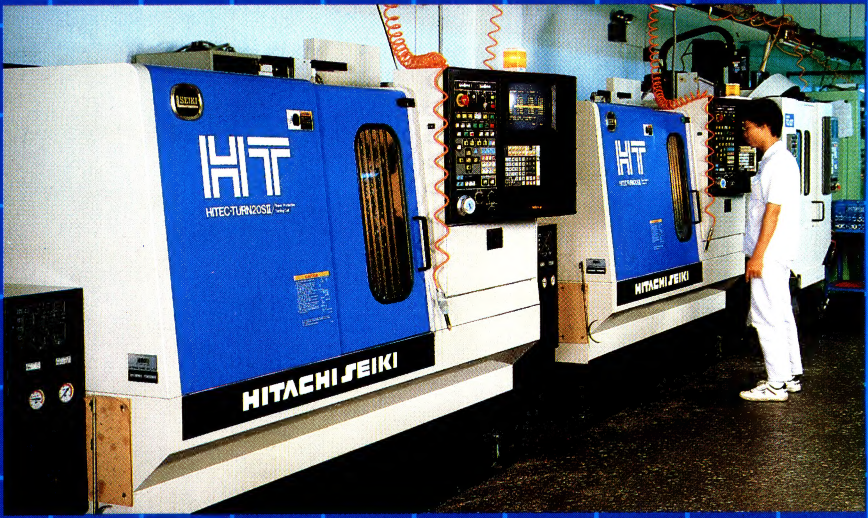

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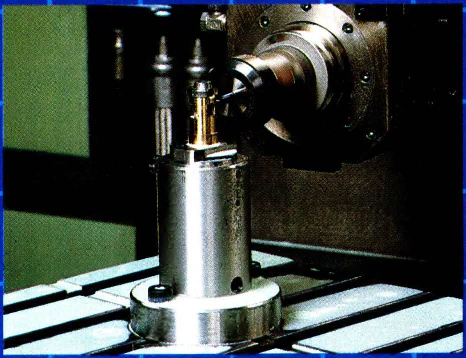

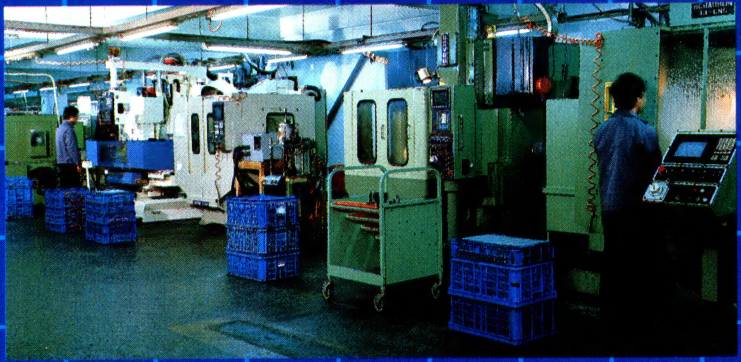

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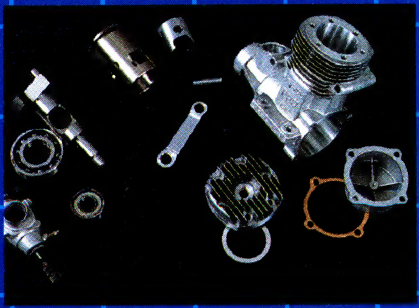

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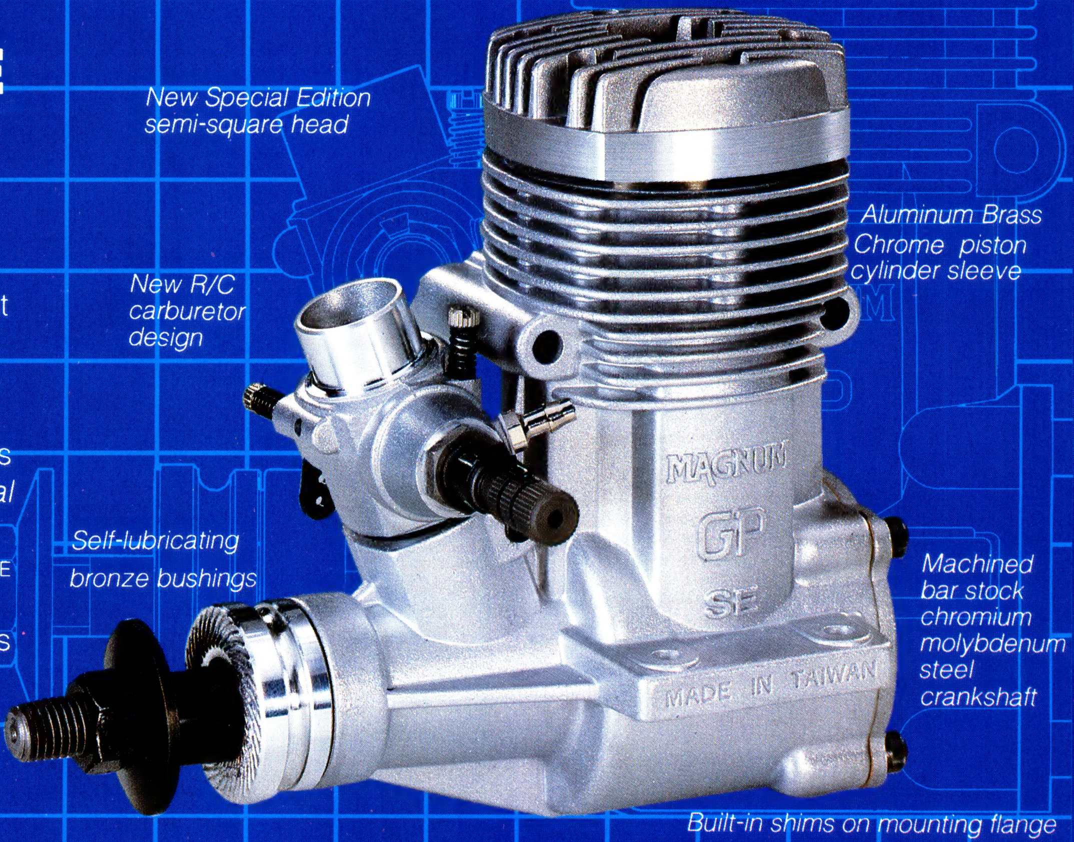

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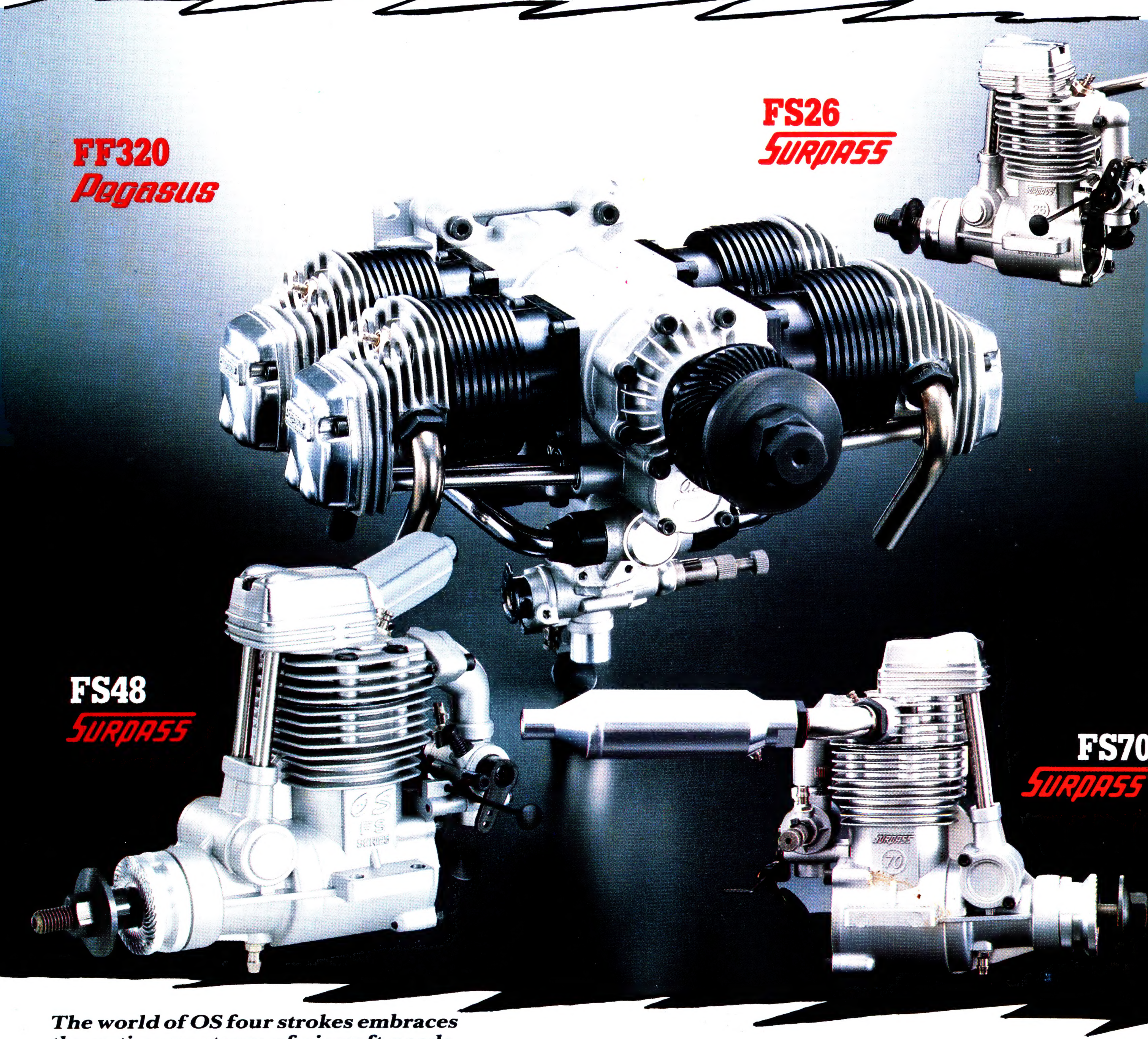

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